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CONNECTICUT STATE ENTOMOLOGIST

THIRTY-FIFTH REPORT

1935

W. E. BRITTON, PH.D.
State Entomologist

Connecticut
Agricultural Experiment Station
New Haven

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CONNECTICUT STATE ENTOMOLOGIST

THIRTY-FIFTH REPORT

1935

W. E. Britton Cf. 23 550

ENTOMOLOGICAL FEATURES OF 1935

The winter of 1934-35 was less severe in Connecticut than the preceding winter, in regard to both snowfall and sustained low temperatures. Nevertheless, low temperatures prevailed in some portions of the State and there was at least one heavy snowfall. Whereas practically all peach buds were killed and no fruit produced in 1934, there was a partial (perhaps 25 to 40 per cent) crop in 1935.

The precipitation for January, June and September was considerably above the normal, but for February, March, April, May, July, August and October was below the normal. Rainfall during the growing season, May to September, inclusive, was about 2.75 inches, or 14.5 per cent, below the normal. The heaviest rainfall came in June and was more than twice the normal amount.

Some of the more important entomological features of the season were the discovery in Connecticut of the European spruce sawfly, *Diprion polytomum* Hartig; the great abundance of the fall canker worm, *Alsophila pometaria* Harr., the eastern tent caterpillar, *Malacosoma americana* Fabr., and the snow-white linden moth or elm spanworm, *Ennomos subsignarius* Hubn.; the comparative prevalence of the forest tent caterpillar, *Malacosoma disstria* Hubn., the lime-tree looper, *Erannis tiliaria* Harr., the larch case bearer, *Coleophora laricella* Hubn., the bagworm, *Thyridopteryx ephemeraeformis* Haw., the elm lacebug, *Corythucha ulmi* Osb. & Dr., the elm leaf aphid, *Myzocallis ulmifolii* Monell; and the comparative scarcity of the Oriental fruit moth, *Grapholitha molesta* Busck, the plum curculio, *Conotrachelus nenuphar* Herbst., the Colorado potato beetle, *Leptinotarsa decemlineata* Say, the gladiolus thrips, *Taeniothrips gladioli* M. & S., the onion thrips, *Thrips tabaci* Lind., the twig pruner, *Hypermallus villosus* Fabr., the European pine shoot moth, *Rhyacionia buoliana* Schiff., and the juniper webworm, *Dichomeris marginellus* Fabr.

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Among the fruit insects, eggs of both the rosy apple aphid, *Anuraphis roseus* Baker, and the green apple aphid, *Aphis pomi* DeG., were present on the twigs in March in most orchards. They were late in hatching

and it was probably due to weather conditions that no severe damage occurred. The fall canker worm was exceedingly prevalent locally in Fairfield and New Haven counties, and in the southern portions of Hartford and Litchfield counties. Many unsprayed apple trees were completely stripped and others partially defoliated. Shade and woodland trees in this region were in a similar condition.

The eastern tent caterpillar, *Malacosoma americana* Fabr., was extremely abundant throughout the State, and defoliated wild cherry and unsprayed fruit trees everywhere. Seemingly 1935 was the peak year, and in some localities there were evidences of wilt disease among the caterpillars. Probably this insect will be plentiful in most localities in 1936 but less so than in 1935. Egg-clusters are now very abundant on fruit trees in some sections of the State, but chokecherry bushes in one locality show only a few.

The apple maggot, *Rhagoletis pomonella* Walsh, the plum curculio, *Conotrachelus nenuphar* Herbst., the pear psylla *Psyllia pyricola* Forst., and the codling moth, *Carpocapsa pomonella* Linn., were all somewhat less prevalent than usual. The European red mite, *Paratetranychus pilosus* C. & F., and the Oriental fruit moth, *Grapholitha molesta* Busck, were both rather scarce in most orchards.

A conspicuous and rather severe injury to the fruit of peach, pear and, to some extent, apple, was common in certain localities and apparently caused by three or four species of plant bugs. White grubs, *Phyllophaga fusca* Froh., injured or destroyed nearly 10 per cent of the budded apple and pear seedlings in a nursery field at Ellington. The strawberry weevil, *Anthonomus signatus* Say, was prevalent in one 3-acre field in Burlington, and caused about 20 per cent damage in June.

Of vegetable insects, cutworms, asparagus beetles, the cabbage worm, *Pontia rapae* Linn., the cabbage maggot, *Hylemyia brassicae* Bouché, and the squash bug, *Anasa tristis* DeG., were all present in normal numbers and caused the usual amount of damage. The Mexican bean beetle, *Epilachna corrupta* Muls., was perhaps slightly less prevalent than in 1934. The Colorado potato beetle, *Leptinotarsa decemlineata* Say, was less prevalent than usual, and the onion thrips, *Thrips tabaci* Lind., was very scarce. The cabbage looper, *Autographa brassicae* Riley, the striped cucumber beetle, *Diabrotica vittata* Fabr., and the potato flea beetle, *Epitrix cucumeris* Harr., at least in certain localities, were more prevalent than in 1934. The corn ear worm, *Heliothis obsoleta* Fabr., was common in southern New Haven County, but in some portions of the State was less abundant than in 1934. The European corn borer, *Pyrausta nubilalis* Hubn., caused more severe damage in New Haven and Fairfield counties to both early and late sweet corn than in 1934, but seemed to be somewhat less destructive in the Hartford region. Second generation borers injured dahlia plants in many sections of the State. At the station farm at Mount Carmel, the borers infested the fruit of young apple trees where corn had been grown between the rows of trees.

Of the insects injuring shade and forest trees, the following were unusually prevalent in the western portion of the State: Eastern tent caterpillar and fall canker worm, already mentioned; the forest tent caterpillar, *Malacosoma disstria* Hubn., the lime-tree winter moth, *Erannis tiliaria* Harr., the snow-white linden moth or elm spanworm, *Ennomos*

subsignarius Hubn., and a smaller Geometrid moth, *Physostegania pustularia* Guen. Adults of the last two species were attracted to lights in Waterbury in large numbers in July. The elm lacebug, *Corythucha ulmi* Osb. & Dr., was prevalent in the northwest corner of the State, and elms in Clinton were heavily infested in August and September by the elm leaf aphid, *Myzocallis ulmifolii* Monell. The bagworm, *Thyridopteryx ephemeraeformis* Haw., partially defoliated four or five small Norway maple street trees in New Haven. The larch case bearer, *Coleophora laricella* Hubn., was prevalent particularly in Litchfield County, where every larch swamp presented a sickly appearance in June because of its ravages. The gypsy moth, *Porthetria dispar* Linn., was as prevalent as usual in infested areas and despite the extensive control measures carried on by state and federal agencies, this insect completely or partially defoliated many acres of woodland in northeastern Connecticut.

The European spruce sawfly, *Diprion polytomum* Hartig, an insect that has devastated thousands of square miles of spruce forest in Canada, was discovered in Connecticut in 1935 by Dr. R. B. Friend. It is now known to be present in Kent, Litchfield, Middlebury, Orange, West Hartford and West Hartland. Thus far it has done little damage, and no one can foretell whether or not this will prove to be a destructive pest in Connecticut.

The following insects were distinctly less prevalent in 1935 than usual: The fall webworm, *Hyphantria cunea* Dru., the twig pruner, *Hypermallus villosus* Fabr., the European pine shoot moth, *Rhyacionia buoliana* Schiff., and the imported willow leaf beetle, *Plagiodera versicolora* Laich.

A weevil from Japan, *Calomycterus setarius* Roelofs, has now appeared in Sharon and Stratford. Chrysanthemum plants in Sharon were considerably injured by it. The Asiatic beetle, *Anomala orientalis* Waterh., continues to injure lawns in New Haven and West Haven, and in a few cases the adults have injured the flowers of hollyhock, iris, lily and rose. The Asiatic garden beetle, *Autoserica castanea* Arr., has injured various flower garden plants in Greenwich and New Haven. Although the grubs have been found in lawns, no definite areas where they have killed the grass have been reported. The Japanese beetle, *Popillia japonica* Newm., has injured vines, blossoms of rose, dahlia, canna, and many other kinds of plants, particularly in Bridgeport, Hartford and New Haven. No particular lawn injury has been reported, although the grubs have been dug from lawns in several localities. The gladiolus thrips, *Taeniothrips gladioli* M. & St., was less prevalent than for the past three years.

Damage to buildings has prompted many inquiries regarding termites, *Reticulitermes flavipes* Koll., and 25 lots of specimens were received; likewise 20 lots of the black carpenter ant, *Camponotus herculeanus pennsylvanicus* DeG., were sent in. Both injure houses. More than one hundred inspections of damaged property have been made.

Some of the more important entomological features are described in greater detail in separate articles and notes printed on other pages of this report. The following list presents an insect pest survey for 1935:

INSECT RECORD FOR 1935

Fruit Insects

Name — Locality, host, date and remarks.

Acrobasis juglandis, walnut case bearer. Injured pecan at Orange, July 24.

Alsophila pometaria, fall canker worm. Unsprayed orchards in Fairfield and New Haven counties completely stripped in June. Egg-mass, Stratford, Nov. 13, 1934; two females and egg-mass on apple, Bethany, Dec. 6, 1934; larva on cherry, Wilton, June 6.

Alypia octomaculata, eight-spotted forester. Larva on grape, West Haven, July 8; adult, Cheshire, Aug. 1.

Anthonomus signatus, strawberry weevil. More prevalent than usual. Burlington, June 12; 20 per cent injury in 3-acre field.

Anuraphis roseus, rosy apple aphid. Eggs were present in most orchards but were late in hatching, and weather conditions probably prevented severe damage. On apple, Norwalk, June 27.

Aphis pomi, green apple aphid. Eggs present in most orchards, but this insect was rather scarce throughout the season.

Aspidiotus perniciosus, San José scale. Present in many localities but not particularly injurious. On apple, South Norwalk, Nov. 30, 1934; apple, East Haven, Apr. 8; cherry, New Haven, Aug. 16; apple, West Haven, Sept. 19.

Bucculatrix pomifoliella, ribbed cocoon maker of the apple. Cocoons, Bridgeport, Apr.22.

Cacoecia argyrospila, fruit tree leaf roller. Eggs abundant in certain orchards in Wallingford, but insect was well controlled by a dormant oil-Bordeaux spray followed by heavy applications of lead arsenate. Injury to pear, Riverton, Nov. 2, 1934.

Cacoecia rosaceana, oblique-banded leaf roller. Larva on apple leaf, Waterbury, June 7.

Carpocapsa pomonella, codling moth. Less prevalent than usual. Fruit from unsprayed apple trees at Mount Carmel only 4 per cent infested.

Coleophora fletcherella, cigar case bearer. Cases on leaves of wild pear, Sharon, June 11.

Conotrachelus crataegi, quince curculio. Injured pear, Guilford, Aug. 27; Woodstock, Sept. 10; quince, Westport, Oct. 18.

Conotrachelus nenuphar, plum curculio. Less prevalent than usual and fruit comparatively free from scars. Injury on apple, Westerly, R. I., Jan. 5; West Hartford, Jan. 29; on cherry, Wilton, June 6; on apple, Thompsonville, June 24; Cobalt, Sept. 10.

Diastrophus cuscutaeformis, blackberry seed gall. On blackberry, Litchfield, Mar. 19.

Diastrophus nebulosus, blackberry knot gall. On blackberry, Wallingford, May 27.

Eriophyes avellanae. On filbert at North Stamford, blasting 25 per cent of the buds, according to E. P. Felt.

Eriophyid galls. On apple, South Norwalk, Nov. 30, 1934.

Eriosoma lanigera, woolly apple aphid. On apple, Warehouse Point, Mar. 29; New Britain, Apr. 2; on hawthorn, Sachem's Head, Sept. 18.

Erythroneura comes, grape leafhopper. Old Saybrook, June 4.

Grapholitha molesta, Oriental fruit moth. Scarce and damage very light in most orchards. Injured peach twig, Hamden, Apr. 10.

Graptolitha (*Xylina*) *antennata*, green fruit worm. Larvae abundant and injured apple and pear. On apple, Eastford, June 4; South Glastonbury, June 15.

Harrisina americana, grape leaf skeletonizer. Adult, Clinton, July 15.

Janus integer, currant stem girdler. Injured currant stem, North Haven, Feb. 18.

Fruit Insects—(*Continued*)

Name	Locality, host, date and remarks.

Lecanium sp. On grapevine, New Haven, Apr. 20.

Leiopus sp. Larva in apple tree, Warehouse Point, Mar. 29.

Lycophotia margaritosa saucia, variegated cutworm. Egg-mass on cherry, Wilton, June 6; egg-mass on apple, hatching, Bantam, June 10; larva, South Glastonbury, June 15.

Lygidea mendax, apple redbug. Characteristic injury on pear, Riverton, Nov. 2, 1934.

Lygus sp. Severe injury to peach fruit, Glastonbury and vicinity, July 22; Waterbury, Aug. 6; to pear, Killingworth, Sept. 26.

Malacosoma americana, eastern tent caterpillar. Extremely abundant throughout the State and defoliated apple and cherry trees. Egg-clusters on peach, Glastonbury, Jan. 11; on flowering crab, Hartford, Feb. 15; on apple, East Port Chester, Mar. 7; Waterbury, Mar. 13; Eagleville, Apr. 1; West Haven, July 5; on cherry, Eagleville, Apr. 1; North Haven, Apr. 16; Branford, Apr. 29; Danbury, Aug. 13.

Myzus cerasi, black cherry aphid. On cherry, Wilton, June 6.

Oecanthus nigricornis, black-horned tree cricket. Eggs in blackberry cane, Branford, Mar. 30.

Oxyptilus periscelidactylus, grape plume moth. On grape, Westport, June 5.

Pachystethus lucicola, light-loving grapevine beetle. On grape, Windsor, July 13, 16.

Paratetranychus pilosus, European red mite. Eggs present in most orchards in March, and the pest was abundant later in some orchards in New Haven County.

Pelidnota punctata, spotted grapevine beetle. Adults on grape, Branford, July 11; New Haven, July 30.

Phyllophaga fusca, a June beetle. Grubs destroyed 10 per cent of budded seedling apple and pear, Ellington, Aug. 7.

Polychrosis viteana, grape berry moth. Larvae in grapes, West Hartford, Sept. 26.

Porcellia scaber, a sowbug or pillbug. In depressions in grapevine roots, Meriden, Nov. 7, 1934.

Pseudococcus citri, citrus mealybug. On grapevine in greenhouse, Thompson, Sept. 12.

Psyllia pyricola, pear psylla. Fairly prevalent in New Haven County. Fairfield, Oct. 30.

Pyrausta nubilalis, European corn borer. Larvae infested apples on young trees at Mount Carmel, where corn was grown between the rows.

Rhagoletis pomonella, apple maggot. Somewhat less prevalent than usual. Damaged apples, Westerly, R. I., Jan. 5; West Hartford, Jan. 29; New Haven, Aug. 23; Windsor Locks, Sept. 3; Cobalt, Sept. 10.

Sphecodina abbotii, abbot sphinx. Larvae on grapevine, Danielson, July 16; Ivoryton, July 19; New Haven, July 23, 24; Stratford, July 31.

Typhlocyba pomaria, white apple leafhopper. Rather scarce in early summer but became abundant in some orchards in August and September.

Zeuzera pyrina, leopard moth. Larva in apple tree, New Haven, Apr. 29; Hartford, Sept. 5.

Vegetable Insects

Name	Locality, host, date and remarks.

Acrosternum hilaris, green stink bug. Nymphs, Bridgeport, July 16; on bean, Bridgeport, Aug. 22; attacking Mexican bean beetle, Cannondale, Aug. 5.

Anasa tristis, squash bug. Present in normal numbers and caused the usual amount of damage.

Aphis maidis, corn leaf aphid. Abundant on growing sweet corn at Mount Carmel, Aug. 21, but caused little damage.

Autographa brassicae, cabbage looper. More prevalent than usual.

Cirphis unipuncta, armyworm. Not prevalent. Larvae in hayfield, Northford, June 28.

Crioceris asparagi, asparagus beetle. Present in usual numbers.

Cutworms. Present in usual numbers and caused the usual amount of damage.

Diabrotica vittata, striped cucumber beetle. Unusually prevalent in many fields of squash. Injured cucumber roots, Milford, July 25; Hamden, Sept. 11.

Empoasca fabae, potato leafhopper. Present and caused tip burn on potatoes, Hartford, New Haven and Tolland counties, July 15.

Epilachna corrupta, Mexican bean beetle. Adults emerged from hibernation two weeks later than usual, but were more abundant than usual on lima beans. On the whole this insect was perhaps slightly less prevalent than in 1934. Bridgeport, Aug. 22; Ivoryton, Sept. 20.

Epitrix cucumeris, potato flea beetle. In certain localities more prevalent than in 1934. On tomato, Hamden, July 26.

Heliothis obsoleta, corn ear worm. Very prevalent in southern New Haven County, infesting about 30 per cent of ears of both early and late sweet corn at Mount Carmel. Larvae, Derby, July 22.

Hylemyia brassicae, cabbage maggot. Normally prevalent.

Illinoia pisi, pea aphid. Abundant in two large fields in New Haven, June 24.

Julus hortensis, garden millipede. Injured asparagus shoots, Cheshire, June 12; tomato and pepper, Westbrook, June 24.

Leptinotarsa decemlineata, Colorado potato beetle. Much less prevalent than usual.

Lixus concavus, rhubarb curculio. Adult, Litchfield, July 16.

Pachystethus lucicola, light-loving grapevine beetle. Adult on corn, Bethany, July 11.

Papaipema nitela, stalk borer. Larva in pea stalk, Meriden, June 21; in corn, Bethany, July 11.

Pontia rapae, cabbage worm. Present in usual numbers.

Pyrausta nubilalis, European corn borer. More prevalent in southern portion of State and somewhat less prevalent in Hartford County than in 1934. At Mount Carmel, ear infestation in early sweet corn ran from 60 to 75 per cent, and in late sweet corn, about 55 per cent. Mortality of larvae in weeds, Hartford area, about 80 per cent. Larvae in potato stalks, Granby, July 29.

Thrips tabaci, onion thrips. Very scarce, almost absent.

Wireworms. Injured potato, Port Chester, N. Y., Oct. 25.

Shade and Forest Tree Insects

Name	Locality, host, date and remarks.

Acrobasis sp., a case bearer. On hickory, Waterbury, June 7.

Adelges abietis, spruce gall aphid. Common on Norway spruce throughout the State. Avon, Mar. 23; New Haven, May 15; West Hartford, May 31; Old Greenwich, June 1; Wethersfield, June 6; Naugatuck, Aug. 12; Norwich, Aug. 20; Hartford, Sept. 20, Oct. 29; on white spruce, Norwalk, Aug. 26.

Adelges piceae, a spruce gall aphid. On balsam fir, Keene, N. H., Mar. 23; on Norway spruce, Wethersfield, June 6.

Agrilus bilineatus, two-lined chestnut borer. Galleries in oak, Saint James, Long Island, N. Y., Nov. 2, 1934.

Alsophila pometaria, fall canker worm. Unusually prevalent in southern and southwestern Connecticut and defoliated many unsprayed fruit, shade and woodland trees. Females on house, East Haven, Nov. 20, 1934; females and egg-mass, New Haven, 1934; Woodbridge, Dec. 22, 1934; egg-masses on beech, Bridgeport, Feb. 25; larvae on purple beech, New Haven, May 13; on cherry, Wilton, June 6; on maple, Wallingford, June 26.

Andricus cornigerus, horned oak gall. Reported by E. P. Felt, on pin oak in southwestern Connecticut.

Andricus piperoides, an oak leaf gall. Litchfield, Oct. 12.

Andricus punctatus, gouty oak gall. On oak twigs, Hamden, Apr. 23.

Aphids (unidentified). On willow, Washington, July 24.

Aphrophora parallela, pine spittle bug. On pine, Redding, June 21.

Argyresthia thuiella, arborvitae leaf miner. Westport, May 13.

Aspidiotus abietis, hemlock scale. On blue spruce, New Haven, Apr. 13.

Aspidiotus ancylus, Putnam's scale. Reported by E. P. Felt, on flowering dogwood, Wilton, Mar. 25.

Cacoecia cerasivorana, ugly-nest caterpillar. On wild cherry, Waterbury, June 10.

Caliroa sp., a sawfly. Larvae on black oak, Hartford, Aug. 5.

Caryomyia holotricha, hickory onion gall. On hickory, Sound View, July 25.

Cerambycid (crushed). Larva in red maple, West Hartford, Sept. 7.

Chionaspis pinifoliae, pine needle scale. On red pine, Sharon, Feb. 8; Hamden, Aug. 7; Hartford, Sept. 18; Wallingford, Oct. 1; on mugho pine, Westerly, R. I., Mar. 19; Washington Depot, May 2; Hartford, May 23; on Austrian pine, Hartford, May 23; on Scotch pine, West Hartford, May 31; on blue spruce, New Haven, Apr. 13.

Cincticornia pilulae, oak pill gall. On oak, Stratford, Mar. 30.

Cincticornia pustulata, oak blister midge. On oak, Middletown, Aug. 14.

Coleophora laricella, larch case bearer. Prevalent and nearly every larch in Litchfield County severely injured. Observed in Canaan, Norfolk and Salisbury. New Haven, June 28.

Conotrachelus juglandis, walnut weevil. Twig injury to Persian walnut, East Haven, Apr. 8.

Corythucha ulmi, elm lacebug. Prevalent in northwestern corner of the State, and elm leaves in Sharon were brown, July 23; West Cornwall, Sept. 13.

Cryptorhynchus lapathi, poplar and willow curculio. In willow, East Haven, July 5.

Cyllene caryae, hickory borer. Adult from black walnut wood, New Haven, Mar. 25; adult in house, West Hartford, Mar. 26.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Cyllene robiniae, locust borer. Adult and pupa in locust, Plainville, Aug. 19; adult and larva in locust, Windsor, Sept. 17.

Cynipid gall. On pin oak, Hartford, July 1.

Dasyneura communis, gouty vein midge. Galls on maple leaves, South Glastonbury, June 15.

Datana integerrima, walnut caterpillar. Larvae on hickory, Waterbury, June 10.

Dendroctonus valens, red turpentine beetle. In white pine, Stafford Springs, June 27.

Diapheromera femorata, walkingstick. Adult, New Haven, Oct. 18.

Dilachnus strobi, a pine aphid. Reported by E. P. Felt, as abundant on white pine in the vicinity of Stamford, depositing its black, shiny eggs on the needles, Oct. 23.

Diprion polytomum, European spruce sawfly. This insect has defoliated thousands of acres of native spruce in Canada, and is now present in Connecticut. West Hartford, Sept. 23; West Hartland, Oct. 8; Middlebury, Oct. 11.

Diprion simile, introduced pine sawfly. Cocoons on white pine, Hamden, Mar. 25.

Dipterous larvae, on elm, Bridgeport, Sept. 25.

Disholcaspis globulus, oak bullet gall. Galls on white oak, Branford, Apr. 22.

Dryophanta lanata, a brown woolly gall on oak leaves. On oak, West Hartford, Aug. 14.

Dryophanta palustris, succulent oak gall. On pin oak, Salisbury, June 4.

Ennomos subsignarius, elm spanworm. Prevalent in western Connecticut. Adults abundant around lights in Bridgeport and Waterbury, in July.

Erannis tiliaria, lime-tree looper. Larvae present on nearly all elm trees in woodlands of Canaan and Salisbury, and those in the villages of Lakeville and Salisbury were partially defoliated, June 18.

Eriophyes parallelus, a mite gall. On sycamore maple, Storrs, Aug. 23.

Eriophyes sp., a mite gall. Purplish erineum on black birch leaves, Woodbridge, May 29, June 3.

Eriosoma americana, woolly elm aphid. On elm leaves, West Goshen, July 6; Niantic, July 25; West Willington, July 29; Mont Alto, Pa., Oct. 19.

Eucosma gloriola, a white pine tip moth. Injured white pine, Greenwich, July 22.

Galerucella xanthomelaena (*luteola*), elm leaf beetle. Present in destructive numbers in some localities and scarce in others. Adults in house, Danbury, Nov. 17, 1934; Danielson, Feb. 1, May 1; New Britain, May 1; New Haven, Apr. 2; West Hartford, May 14; Ansonia, May 14; Middletown, May 15; Westport, June 1; larvae and pupae, Derby, July 16; Putnam, July 25.

Gillettea cooleyi, blue spruce gall aphid. On blue spruce, East Port Chester, June 5; Waterbury, July 25; Kent, Aug. 22; Hartford, Oct. 29; on Douglas fir, East Haven, June 21.

Haltica ulmi, green elm beetle. Injured leaves and cast skins, Milford, Aug. 22.

Haploa sp., a tiger moth. Pupa suspended in needles of red pine, Sharon, Feb. 8.

Harmologa fumiferana, spruce budworm. Injured spruce, New Haven, June 17.

Heterocampa guttivitta, saddled prominent. Larva on daisy, Hamden, Sept. 13.

Hylobius pales, pales weevil. Injured white pine shoots, Greenwich, May 14.

Shade and Forest Tree Insects—(*Continued*)

Name	Locality, host, date and remarks.

Hylurgopinus rufipes, dark native elm bark beetle. Common in eastern part of State, and at Torrington, Winsted and Riverton, where adults entered live branches to breed about June 5. Dead adults and hibernating larvae in brood tunnels, Old Lyme, Mar. 23.

Hypermallus villosus, twig pruner. Injured oak, New Haven, July 9.

Immature bug, on Norway spruce, Thompsonville, June 24.

Itycorsia sp., a sawfly. Frass balls on red pine, Middletown, Dec. 21, 1934; Hamden, Apr. 1; Woodbridge, July 16.

Kaliofenusa ulmi, elm leaf miner. In elm leaves, Centerbrook, July 1.

Leaf roller, on Norway maple, Gales Ferry, June 28.

Lecanium corni, European fruit lecanium. On osage orange, New Haven, June 17.

Lecanium fletcheri, arborvitae soft scale. On arborvitae, Cromwell, June 22; Westerly, R. I., July 31.

Lecanium nigrofasciatum, terrapin scale. On red maple, Hamden, Sept. 22.

Lepidopterous larva (green). On white pine, Killingworth, June 6.

Lepidosaphes ulmi, oyster-shell scale. Heavy infestation on willow, New Haven, Nov. 14, 1934.

Leucaspis japonica, a Japanese scale. On Norway maple street trees, New Haven, Apr. 23.

Lithocolletis sp., a locust leaf miner. Larvae and pupae in leaves of black locust, South Norwalk, Sept. 10.

Longistigma caryae, a large twig aphid. On oak, New Haven, Nov. 8, 1934; on linden, New Haven, Mar. 6; on pin oak, Hartford, July 1.

Magdalis sp. Larvae in elm twigs, East Haddam, Mar. 15.

Malacosoma americana, eastern tent caterpillar. Extremely abundant throughout the State. Egg-clusters on wild cherry, Eagleville, Apr. 1; North Haven, Apr. 16; Branford, Apr. 29; Danbury, Aug. 13.

Malacosoma disstria, forest tent caterpillar. Caterpillars fairly common in woodland areas of Canaan, Colebrook and Salisbury but caused no extensive damage. Larvae, Litchfield, June 25; pupae, West Goshen, July 6.

Matsucoccus matsumurae, a scale. On pitch pine, Chaplin, Sept. 18.

Mites. On maple, Ridgefield, July 26.

Myzocallis ulmifolii, elm leaf aphid. Simsbury, Aug. 27; very abundant, Clinton, Aug. and Sept.

Neoborus sp., a plant bug. Reported by E. P. Felt as common on ash, Stamford, June 22.

Neodiprion lecontei, red-headed pine sawfly. Cocoons on white pine, Wilmington, Del., Nov. 1, 1934; larvae on mugho pine, North Haven, Sept. 11.

Neodiprion pinetum, black-headed pine sawfly. Larvae on white pine, Lime Rock, Nov. 5, 1934; North Guilford, Sept. 25.

Neoprociphilus aceris, woolly maple aphid. On maple, Kensington, June 15.

Neuroterus irregularis, a Cynipid gall. Reported by E. P. Felt as present in immense numbers on swamp white oak, Greenwich, June 22.

Neuroterus sp., a Cynipid gall. Old galls on oak, Southington, May 8.

Shade and Forest Tree Insects—(*Continued*)

Name	Locality, host, date and remarks.

Noctuid larva. On elm, Litchfield, June 25; West Goshen, July 6; on hemlock, New Canaan, June 29.

Oecanthus nigricornis, black-horned tree cricket. Egg punctures in willow twig, Waterbury, Apr. 13.

Orthotylus chlorionis, a plant bug. On honey locust, Manchester, June 13.

Pachypsylla celtidis-gemma, hackberry bud gall. On hackberry, New Haven, Mar. 8.

Paleacrita vernata, spring canker worm. Reported by E. P. Felt that eggs were present locally with those of the fall canker worm, Mar. 25.

Paratetranychus bicolor, oak mite. On oak, West Hartford, Aug. 14.

Paratetranychus ununguis, spruce mite. On spruce, Springdale, May 2; Stafford, May 8; Bridgeport, May 25; Rockville, July 6; Westport, July 13; on arborvitae, Westport, July 13; Westerly, R. I., July 31; on juniper or cedar, Wilton, June 6; East River, June 18; New Haven, July 25; Clinton, Aug. 6; on hemlock, Norfolk, Oct. 9; on Retinospora, Westport, May 13.

Periphyllus sp., an aphid. On maple, Westbrook, Sept. 27.

Phenacoccus acericola, woolly maple leaf scale. On sugar maple, New Haven, Aug. 27.

Phloeosinus canadensis, a bark beetle. In arborvitae, New Britain, Sept. 17.

Phyllocoptes aceris-crumena, maple spindle gall. On sugar maple, Thompson, July 13.

Phyllocoptes mastigophorus, a mite gall. On elm, Cleveland, Ohio, Sept. 23.

Phyllocoptes quadripes, maple bladder gall. On silver maple, Clinton, June 4; West Hartford, June 4; Devon, June 6; Windsor, June 11; Pomfret Center, June 14; Mount Carmel, July 2.

Phylloxera caryaecaulis, hickory leaf-stem gall aphid. On hickory, Cannondale, July 15.

Physokermes piceae, spruce bud scale. On white spruce, Rockville, July 6.

Physostegania pustularia, a small white Geometrid. Moths in large numbers around lights, Waterbury, July 26; Norfolk, Aug. 20.

Phytophaga rigidae, beaked willow gall. On willow, Woodbridge, Apr. 12.

Pineus strobi, pine bark aphid. On white pine, Norwalk, June 26; Greens Farms, Aug.13.

Pissodes strobi, white pine weevil. In pine, Hartford, July 3; Greenwich, July 22; in Norway spruce, New Haven, July 16; Ivoryton, July 29; Bridgeport, Aug. 9.

Plagiodera versicolora, imported willow leaf beetle. Adults on willow, Bridgeport, June 4; Watertown, June 19.

Pontania pisum, willow pea gall. On willow leaves, Watertown, June 19.

Porthetria dispar, gypsy moth. Present in usual numbers except for increased activities in controlling it, through federal relief appropriations, particularly in CCC Camps. Some defoliation in Windham County in 1935.

Prionus laticollis, broad-horned prionus. Larva in oak, Wakefield, R. I., Sept. 20.

Pseudococcus comstocki, catalpa mealybug. On catalpa street trees, New Haven, Sept. 5.

Pulvinaria vitis, cottony maple scale. On silver maple, New Haven, June 26.

Rhabdophaga salicis, a willow twig gall. On willow, Clinton, Nov. 23, 1934.

Rhabdophaga sp., a willow gall. On willow, Woodbridge, Apr. 12.

Shade and Forest Tree Insects—(*Continued*)

Name — Locality, host, date and remarks.

Rhyacionia buoliana, European pine shoot moth. On mugho pine, East Haven, May 21; on red pine, Fisher's Island, N. Y., June 28.

Saperda tridentata, elm borer. Larvae in elm, Waterbury, Apr. 23; half-grown larvae in tunnels in elm, Danielson, Mar. 18.

Sawfly injury to jack pine, Middlefield, July 26.

Scolytus multistriatus, small European bark beetle. Dead adults and hibernating larvae in brood tunnels, New Haven, Mar. 23.

Stilpnotia salicis, satin moth. This insect was not much in evidence in 1935.

Thyridopteryx ephemeraeformis, bagworm. Old winter cases on arborvitae, Forest Hills, N. Y.; larvae on Norway maple street trees, New Haven, July 23; on arborvitae, Westport, Oct. 9.

Tomostethus bardus, an ash sawfly. Larvae on ash, New Haven, June 1.

Toumeyella liriodendri, tulip tree scale. Fairfield, Aug. 5; Southington, Aug. 27, Sept. 25; Middletown, Sept. 14; Winsted, Sept. 18; Stamford, Sept. 23.

Insects of Ornamental Shrubs and Vines

Agrilus communis ab. *rubicola*, rose stem girdler. On *Rosa hugonis*, North Haven, Sept. 26.

Amphion nessus, nessus sphinx. Adult, New Haven, June 20.

Aphis cerasifoliae, a cherry aphid. On chokecherry, Hamden, Aug. 28.

Brachyrhinus sulcatus, black vine weevil. Grubs injured roots of Taxus, New Haven, May 16.

Caliroa aethiops, rose sawfly. Rose leaves injured by larvae, Bridgeport, June 24.

Callosamia promethea, promethea moth. Cocoon on spicebush, Wallingford, May 27.

Chionaspis euonymi, euonymus scale. On euonymus, West Haven, Aug. 10; New Haven, Oct. 9.

Cingilia catenaria, chain-spotted geometer. Adults, Brooklyn, Oct. 31.

Dichomeris marginellus, juniper webworm. Much less prevalent than usual. On juniper, Stamford, Mar. 12; East Haven, May 21.

Enchenopa binotata, two-marked treehopper. Wax covering where eggs had been laid, conspicuous on ornamental shrubs, Redding, Apr. 23. (Reported by E. P. Felt.)

Eriophyes sp., a mite gall. On pearlbush, Washington, July 17.

Eurycyttarus confederata, a small Psychid moth. Unusually prevalent. Larval cases, New Haven, June 15, 18; Hamden, June 24; Branford, June 28.

Gracilaria azaleella, an azalea leaf miner. Larva in mined azalea leaves, Springfield Gardens, Long Island, N. Y., Aug. 9.

Hyphantria cunea, fall webworm. Nest on lilac, Clinton, Aug. 6.

Insects of Ornamental Shrubs and Vines—(*Continued*)

Name	Locality, host, date and remarks.

Lachnus tomentosus, an aphid. Reported by E. P. Felt as seriously infesting a few mugho pines at North Stamford, Oct. 23.

Laertias philenor, blue swallow-tail butterfly. Larvae on dutchman's-pipe vine, Ridgefield, Aug. 17.

Lepidosaphes ulmi, oyster-shell scale. On lilac, New Haven, Mar. 4; Hartford, Mar. 7; East Haven, Mar. 27; Hamden, May 2; Westport, May 17; on pussy willow, Bridgeport, Mar. 27; on viburnum, Hartford, May 16.

Mites. On box, Old Lyme, June 26.

Oberea tripunctata var. *myops*, a round-headed borer. Injury to azalea stem, Windsor, Sept. 23.

Omphalocera dentosa, barberry webworm. Old webs on barberry, Stepney, Mar. 12.

Oniscus asellus, a sowbug or pillbug. Injured rhododendron seedlings, Clinton, June 14.

Pissodes approximatus, a pine weevil. Injury to mugho pine, Waterford, Nov. 15, 1934.

Plant bug. Injured leaf, Greenwich, June 27.

Popillia japonica, Japanese beetle. Adults riddled foliage of rose, grape and Virginia creeper, Bridgeport, in July.

Prionomerus calceatus, a weevil. Injury to bayberry, June 22. (Reported by E. P. Felt.)

Rhodites globuloides, a root gall on rose. On *Rosa rugosa*, Branford, Mar. 19, Apr. 16.

Rhopalosiphum berberidis, barberry aphid. Heavy infestation on Japanese barberry hedge, New Haven, May 23.

Samia cecropia, cecropia moth. Cocoon on spiraea, New Haven, Nov. 20, 1934; eggs on rhododendron, New Haven, July 15; larva, Cromwell, Aug. 31.

Sciarid larvae, on rhododendron, New Haven, May 6.

Sesia rhododendri, rhododendron borer. In rhododendron, Naugatuck, Apr. 3.

Stephanitis rhododendri, rhododendron lacebug. Injured leaves, Naugatuck, Apr. 3; adults and injured leaves, Springdale, July 30.

Tetraleurodes mori var. *maculata*, mulberry whitefly. On rhododendron, New Haven, Sept. 19.

Tortricid larva (crushed). On rose leaf, Cheshire, June 25.

Insects of Flowers and Greenhouse Plants

Agromyza maculosa, a chrysanthemum leaf miner. Severe damage to chrysanthemums in greenhouse, Hamden, Sept. 4.

Aphids. On Jerusalem cherry, West Haven, Nov. 15, 1934; on aster, Wallingford, July 31; on stocks in greenhouse, Sharon, Oct. 29.

Anomala orientalis, Asiatic beetle. Adults injured iris and lily, New Haven, July 12.

Insects of Flowers and Greenhouse Plants—(*Continued*)

Name	Locality, host, date and remarks.
Autoserica castanea,	Asiatic garden beetle. Adults injuring various flowers, Riverside, Aug. 2; on chrysanthemum, New Haven, July 26.
Calomycterus setarius,	a Japanese weevil. Adults injured chrysanthemum, Sharon, July 23, 25; Stratford, Aug. 21.
Colaspis brunnea,	grape colaspis. Adult on garden plants, Westport, July 13.
Deloyala clavata,	clavate tortoise beetle. Adults on Chinese lantern plants, Hamden, June 24.
Dipterous larvae,	in roots of phlox, Clinton, Aug. 6.
Dipterous puparia,	in stem of perennial phlox, Clinton, Aug. 1.
Empoasca fabae,	potato leafhopper. Injured dahlia, Wallingford, July 8; New Haven, July 23.
Epicauta cinerea,	gray blister beetle. Adults injured dahlia and gladiolus, Middletown, Aug. 19.
Epicauta marginata,	margined blister beetle. Adults on lily, New Haven, July 30.
Epicauta pennsylvanica,	black blister beetle. Adults injured gladiolus, Essex, Aug. 24.
Hemichionaspis aspidistrae,	fern scale. On Boston fern, Bridgeport, Oct. 11.
Heterocampa guttivitta,	saddled prominent. Larva on daisy, Hamden, Sept. 13.
Homorus undulatus,	a weevil. Injured lily-of-the-valley leaves, Mill Plain, Sept. 4.
Macrosiphum rudbeckiae,	goldenglow aphid. On unidentified composite plant, Wallingford, June 14.
Mamestra adjuncta,	a Noctuid moth. Green larva on garden plants, New Haven, June 29.
Meloe angusticollis,	an oil blister beetle. Adult on larkspur, New Haven, Apr. 23; adults, Hartford, Oct. 2.
Mononychus vulpeculus,	iris seed weevil. On cultivated iris, Wallingford, July 4.
Pelidnota punctata,	spotted grapevine beetle. Adult on garden flowers, Northford, Aug. 2.
Phlyctaenia rubigalis,	greenhouse leaf tier. Larvae on primrose, New Haven, Mar. 8; larvae (crushed) from greenhouse, Westport, June 20.
Plutella porrectella,	a small moth. Larvae webbed together and fed upon the leaves of sweet rocket, New Haven, May 8.
Poecilocapsus lineatus,	four-lined plant bug. Injury to chrysanthemum, Bridgeport, June 24; Fairfield, July 15; injury to dahlia, Hartford, June 26.
Popillia japonica,	Japanese beetle. Adults injured dahlia and other flowers, Bridgeport, in July; on chrysanthemum, New Haven, Aug. 13; adults, Milford, July 20.
Pseudococcus citri,	citrus mealybug. On fern and coleus, Jewett City, Jan. 25; on geranium and dahlia, West Hartford, Sept. 3; on grape in greenhouse, Thompson, Sept. 12.
Pyrausta nubilalis,	European corn borer. Injured dahlia plants, in many parts of the State.
Rhizoglyphus hyacinthi,	bulb mite. Injured daffodil bulbs, East Haven, Aug. 24.

Insects of Flowers and Greenhouse Plants—(*Continued*)

Name	Locality, host, date and remarks.

Saissetia hemisphaerica, hemispherical scale. On fern, Stamford, Dec. 21, 1934.

Sibine stimulea, saddle-back caterpillar. Larva feeding on gladiolus, West Haven, Aug. 30.

Taeniothrips gladioli, gladiolus thrips. Less prevalent than in 1934. Hamden, Aug. 22.

Tarsonemus pallidus, cyclamen mite. On larkspur, North Haven, May 13; Stamford, May 23.

Tetranychus bimaculatus, red spider. On carnation, Meriden, Jan. 11; on geranium, Lakeville, Apr. 3.

Weevil larvae. In base of dead stalks, Middlebury, July 25.

White grubs. Possibly injured narcissus bulbs, Waterbury, Oct. 24.

Wireworms. In roots of phlox, Clinton, Aug. 6; in narcissus bulbs, Waterbury, Oct. 24.

Insects of Soil and Lawn

Amara, sp., a ground beetle. Adults, Hartford, June 27; Bloomfield, July 9.

Anomala orientalis, Asiatic beetle. Mr. McFarland examined 18 lawns in New Haven and West Haven that were infested by this insect. Grubs received from New Haven, Nov. 10, 1934; May 15, 16; Sept. 9; West Haven, May 10, Oct. 31.

Ants (unidentified). New Haven, June 25.

Aphodius granarius, a small Scarabaeid beetle. Adults in greenhouse, Hamden, Jan. 26.

Autoserica castanea, Asiatic garden beetle. Larvae in lawn, New Haven, Mar. 5; in soil, New Haven, May 3; in garden, Greenwich, June 17.

Blissus hirtus, hairy chinch bug. Caused severe injury to lawn, 1,200 square feet of creeping bent grass destroyed, Westport, Aug. 15; injured lawn, Newtown, Aug. 16.

Carabid beetle. Larva, Melrose, June 6.

Carabus limbatus, a large ground beetle. In soil, Greenwich, June 6.

Collembolan (unidentified). In greenhouse soil, West Haven, Nov. 15, 1934.

Gryllotalpa hexadactyla, northern mole cricket. In soil, Ledyard, May 31.

Lasius niger, an ant. In garden, Westport, Apr. 22.

Lasius sp., ants. In lawn or soil. Sandy Hook, May 2; Greenwich, June 6; Bristol, Sept. 13; New Britain, Sept. 16; Meriden, Oct. 21; Stratford, Oct. 22.

Lucanus capreolus, stag beetle. Adult, New Haven, July 30.

Phyllophaga tristis, a small June beetle. Adult from garden, Greenwich, June 6.

Phyllophaga sp., June beetle. Larvae in lawn, Woodbridge, July 26; East River, Aug. 5.

Popillia japonica, Japanese beetle. Larvae in lawn, New Haven, Mar. 5; adults, New Haven, Aug. 16; New London, Sept. 6.

Sphecius speciosus, cicada killer; digger wasp. Nests in lawn, Essex, Aug. 17.

Tarpela micans, a Tenebrionid beetle. Adults from soil, Norwalk, May 24.

Insects Infesting Stored Food Products

Name — Locality, host, date and remarks.

Acanthoscelides obtectus, bean weevil. Adults in pantry, Farmington, July 1.

Cecidomyid fly (unidentified). Adults in chicken feed, Norwich, Aug. 31.

Dermestes cadaverinus, a larder beetle formerly listed as *D. nidum*, but which is not that species. Adults in house, New Haven, Nov. 20, 21, 1934; adults, South Norwalk, June 19; adult, Riverside, Oct. 15.

Dermestes lardarius, larder beetle. Adults and larvae injured hams, Danbury, June 27.

Dermestes sp. (unidentified). Larvae in tankage from Argentina, Hamden, Aug. 31.

Ephestia kuehniella, Mediterranean flour moth. Larvae in macaroni flour, New Britain, Sept. 16.

Gnathocerus cornutus, a Tenebrionid beetle. Larvae in macaroni flour, New Britain, Sept. 16.

Laemophlaeus pusillus, a small Cucujid beetle. Adults in chicken feed, Norwich, Aug. 31.

Oryzaephilus surinamensis, saw-toothed grain beetle. Adults in stored food, New Haven, Sept. 24.

Pyrausta nubilalis, European corn borer. Larvae in cake in a store, New Haven, Sept. 26.

Sitodrepa panicea, drug store beetle. Adults in dog food, West Hartford, Aug. 17.

Sitophilus granaria, granary weevil. Adults in house, North Plains, May 31.

Trogoderma tarsale, large cabinet beetle. Larva in tobacco seed, Hartford, Apr. 10.

Household Insects

Anthrenus scrophulariae, carpet beetle. Larvae in house, Greenwich, Apr. 3, May 1; Wethersfield, Apr. 12; New Britain, May 29.

Ants (crushed and unidentified). In house, North Haven, Mar. 19; New Britain, July 27; New Haven, May 20, June 5, Oct. 15.

Attagenus piceus, black carpet beetle. Larvae in house, Wilton, Nov. 16, 1934; Greenwich, Apr. 3; Wethersfield, Apr. 12; Manchester, May 10; Norwalk, Aug. 27; New Britain, Sept. 16; adults and larvae, New Haven, Apr. 2, 3, 27; West Haven, July 16; adults, Wallingford, June 6; Hamden, July 1.

Blattella germanica, German cockroach. In house, New Haven, Nov. 19, 1934.

Brachyrhinus ovatus, strawberry root weevil. Adults in house, Hartford, Aug. 9.

Bryobia praetiosa, clover mite. Large numbers in house, Norwalk, May 22.

Lasius claviger, an ant. In house, Guilford, Oct. 17.

Lepisma saccharina, silverfish. In house, New Haven, Sept. 17. Other specimens received may be this or some other species. Hartford, Oct. 7; in house (crushed), West Hartford, May 2; New Haven, Feb. 25.

Household Insects—(*Continued*)

Name — Locality, host, date and remarks.

Monomorium pharaonis, Pharaoh's ant. In house, Essex, Aug. 2.

Scutigera forceps, house centipede. Adults in house, Meriden, Mar. 18; New London, July 9; Hamden, July 30.

Tineola biselliella, webbing clothes moth. Adults, Greenwich, May 1.

Insects Infesting Timbers and Wood Products

Arhopalus fulminans, thunderbolt beetle. In cord wood, New Haven, Mar. 15.

Callidium violaceum, a long-horned beetle. Adults from cedar cabin, Seymour, May 10; adults from lumber, Winsted, June 11.

Calloides nobilis, a large long-horned beetle. Adult, New Haven, July 30.

Camponotus herculeanus pennsylvanicus, black carpenter ant. In all, 20 different lots, as follows: Adults from theater, New Haven, Apr. 10; workers from tree, New Haven, May 1; adults, New Haven, May 3; adults from house, New Haven, May 31; New Britain, Apr. 29; Waterbury, Apr. 29; Hartford, May 13; Washington, May 23; adults from porch, West Hartford, June 8; Hartford, June 20; adults, Middletown, June 11; Lakeville, June 15; adults from factory, East Hampton, June 14; frass and pupa skins, Bridgeport, Aug. 9; adults from house, Old Lyme, June 26; Wallingford, June 27; Sharon, Aug. 15; Cornwall, Aug. 19; Saybrook, Oct. 9.

Cerambycid larvae (larvae of a long-horned beetle). From log cabin, Stafford Springs, Apr. 5.

Flat-headed borer, in spruce lumber, Ansonia, Mar. 15.

Hadrobregmus carinatus, an Anobiid beetle. Adults from floor boards of house, New London, Mar. 26.

Lyctus sp., a powder-post beetle. Damaged wood, Westport, Aug. 3; timbers from house, Farmington, Aug. 12; in pine, Litchfield, Aug. 19.

Osmoderma scabra, a Scarabaeid beetle. Adult, New Haven, July 30.

Phymatodes variabilis, a common long-horned beetle. Larvae in oak and cherry logs, Milford, Apr. 23; adults, New Britain, June 12; New Haven, June 27.

Psen sp. (broken), a wood-nesting bee. In wood, Westport, Aug. 3.

Reticulitermes flavipes, common termite. In all, 25 different lots, as follows: Specimens, Brookfield, Apr. 20; South Manchester, Apr. 30; Norwich, May 1; New Haven, May 31; from wood in yard, Foxon, East Haven, Apr. 29; from cellar, Stamford, May 29; from garage, Greenwich, July 9; from porch, New Haven, Nov. 23, 1934; May 30; from house, Glastonbury, Mar. 29; Bridgeport, Apr. 5; Old Lyme, Apr. 29; Simsbury, Apr. 30; Windsor, May 3; Glenbrook, May 4; New Britain, May 6; Southport, May 8; Hamden, May 8; Orange, May 8; Noank, May 9; East Hartford, May 10; Hartford, May 21; Meriden, May 31; New Haven, May 31.

Xylotrechus colonus, rustic borer. Adults from cord wood, New Haven, Mar. 13.

Insects Annoying Man and Domestic Animals

Name — Locality, host, date and remarks.

Aëdes canadensis, a fresh-water woodland mosquito. Larvae, Greenwich, May 7.

Chrysops morosus, a deer-fly. Adults, Clinton, July 24.

Linognathus piliferus, dog louse. From dog, Cheshire, Mar. 18.

Mosquito larvae and pupae. In well water, Clintonville, Oct. 8.

Reduviid bug (immature). Bit a person, Clinton, Aug. 3.

Spiders

Epeira sp., an orb weaving spider. Egg-mass on spruce reported to be a gypsy moth egg-cluster, Southington, Jan. 11.

Latrodectus mactans, black widow spider. Female, Norwichtown, June 25; immature female, Leete's Island, Sept. 29.

Lycosa carolinensis, a wolf or ground spider. Male, in cellar, Plainville, Oct. 30.

Mastophora bisaccatum, an orb weaving spider. Egg-sac on apple, North Haven, Apr. 8.

Micrathena sagittata, a spiny flower spider. Female, on flower, Hamden, Sept. 24.

Spiders' eggs (unidentified). On cedar, Branford, Apr. 16; old egg-sac, Bridgeport, Apr. 22.

Tarantula. A small one in bunch of bananas, West Haven, Aug. 7; a large one also in bananas, New Haven, Aug. 22.

Beneficial Insects

Adalia bipunctata, two-spotted ladybeetle. Adult in house, Washington, Feb. 28.

Anatis quindecimpunctata, 15-spotted ladybeetle. Egg-cluster on black birch, Waterbury, June 7.

Apanteles sp. (unidentified), from larvae on Norway maple, Ridgewood, N. J., July 1.

Calosoma sycophanta, introduced calosoma. Adult, New Haven, July 30.

Calosoma wilcoxi, a ground beetle. Adult, New Haven, July 30.

Chrysopa oculata, aphis lion. Adults on tomato infested with aphids, Hamden, July 31.

Hippodamia tredecempunctata, 13-spotted ladybeetle. Adult, Hamden, July 30.

Megarhyssa atrata, black long sting. Adult females, West Haven, June 11; Rockville, July 6; Stonington, July 10.

Pentatomid bug (very young). Devouring aphids on spiraea, Newtown, Aug. 16.

Podisus maculiventris, spined soldier bug. Adults destroying tent caterpillars, Hamden, May 13; destroying larvae of the Colorado potato beetle, Storrs, July 22.

Stiretrus anchorago, a predaceous Pentatomid bug. Adult, Marlborough, July 30.

Syrphid fly. Larva on apple, Waterbury, June 7.

Tenodera sinensis, Chinese praying mantid. Adult male, West Haven, Sept. 10, 16; female, Hamden, Oct. 5.

Miscellaneous

Name — Locality, host, date and remarks.

Alaus oculatus, eyed elater. Adults, Milford, June 12; Northford, June 25; New Haven, July 10; Guilford, Aug. 8.

Anisota rubicunda, green-striped maple worm. Adult moth, Brookfield, Aug. 7.

Anisota virginiensis, Virginian oak worm. Adults, Pomfret, July 16; Cheshire, Aug. 1

Aphids. On side of house, New Haven, Sept. 18.

Atherix variegata, an aquatic Leptid fly. Females and egg-masses in large numbers on cement concrete bridge, over the water of Housatonic River, Cornwall Bridge, June 6.

Caddice fly cases. Several cases with dead larvae, from reservoir, East Hartford, Dec. 20, 1934.

Calliphora erythrocephala, a scavenger fly. Adult, Clinton, July 24.

Calliphora vomitoria, common blowfly. Adult, New Haven, May 31.

Chaoborus sp., a mosquito. Larvae in drinking water, Manchester, May 1.

Chelymorpha cassidea, argus tortoise beetle. Adult, Marlborough, July 30.

Chironomid fly, a midge. Adult (broken, legs and antennae gone) in house, Westport, Apr. 13; adults (crushed) in house, Hartford, Apr. 27.

Chironomus sp. (unidentified), a midge. Larvae in spring water, Hartford, Jan. 16; Greenwich, May 7; Clintonville, Oct. 8.

Citheronia regalis, regal moth. Adult, Cheshire, Aug. 1.

Cockroach (tropical). Adult, Woodmont, Sept. 18.

Colias eurytheme, orange sulfur butterfly. Adult, Cheshire, Aug. 1.

Corydalis cornuta, hellgramite or dobson fly. Adult male, Hamden, July 9.

Cotinis nitida, green June beetle. Adult, West Haven, Sept. 16.

Cucujus clavipes, a flat, bright red beetle. Adult under elm bark, Litchfield, Feb. 11.

Cyprid (unidentified), a small crustacean. In spring water, Hartford, Jan. 26.

Deidamia inscripta, the lettered sphinx. Adult, New Haven, June 12.

Dianthidium notatum, a leaf-cutter bee. Adult, on outside of window of house, Norwich, May 2.

Dicranomyia simulans, a crane fly. Adults, from sewage disposal plant, Watertown, Nov. 9, 1934.

Diptera (unidentified), a small fly. Adults in greenhouse, Hamden, Jan. 26.

Ephemerid (crushed), a May fly. Adult, in house, Essex, Apr. 27.

Eristalis sp. (unidentified), a Syrphid fly. Larva in elm tree, Waterbury, Apr. 23.

Glischrochilus fasciatus, a Nitidulid or sap beetle. Adults in galleries of poplar and willow curculio; in willow, East Haven, July 5.

Gordius sp. (unidentified), a hair snake. In fresh water pond, New Haven, Sept. 6.

Hister interruptus, a Histerid beetle. Adults on ground and thought to be Asiatic beetles, New Haven, June 12.

Miscellaneous—(*Continued*)

Name	Locality, host, date and remarks.
Hololepta fossularis, a Histerid beetle.	Adult, Storrs, June 8.
Ichneumon wasp (unidentified).	In house, New Britain, Apr. 30.
Labioderma clivicollis, a Scarabaeid beetle.	Adult, Eastford, June 4.
Lipolexis (*Trioxys*) *piceus*, a Braconid wasp.	Adult, Storrs, May 2.
Lucidota atra, a Lampyrid beetle.	Adult, Clinton, July 15.
Lucilia caesar, a scavenger fly.	Adult, New Haven, May 31.
Metriona bicolor, golden tortoise beetle.	Adults, Greens Farms, June 15.
Mycetobia divergens, a Rhyphid fly.	Larvae under bark of trees, New Haven, May 23; larvae under bark of elm trees, Stafford Springs, July 16.
Mycetophilid (unidentified), a fungus gnat.	Pupae in dead wood, Bridgeport, June 1.
Noctuid moth (badly worn).	Adult, Litchfield, Sept. 20.
Nonagria oblonga, a cat-tail borer.	Reared from larva in cat-tail, Norwichtown, Aug. 2.
Oligochaeta sp. (unidentified), an Annelid worm.	Disintegrated specimens from sewer filter, Litchfield, May 1.
Papilio glaucus form *turnus*, tiger swallow-tail butterfly.	Larva, New Haven, July 13.
Paragrotis perpolita, a Noctuid moth.	Adult (crushed) in letter, Hartford, July 27.
Podura aquatica, a Collembolan.	Occurred in large numbers in street gutter, Torrington, Apr. 2.
Polyplax spinulosa, a rat louse.	On rat, Cheshire, Oct. 14.
Psocid (crushed).	Adult in house, Litchfield, July 16.
Psychoda sp. (unidentified), a small fly.	Adults around filter plant, Hartford, June 26.
Romaleum rufulum, a large long-horned beetle.	Adult, Pomfret, Aug. 1.
Sarcophaga sp., a scavenger fly.	Adult, Clinton, July 19.
Silpha americana, a carrion beetle.	Adults, South Glastonbury, June 15; Deep River, July 16.
Sphinx chersis, ash sphinx.	Adult, Cheshire, Aug. 1.
Sphinx drupiferarum, cherry sphinx.	Adult, Wallingford, Aug. 13.
Spirobolus marginatus, a large thousand-legged worm.	Adults, West Haven, June 1; Bridgeport, June 6.
Staphilinid beetle (unidentified).	Adult (crushed) in house, New Britain, Apr. 30.
Syrphid fly (unidentified).	Adult (crushed) from decayed wood, Bridgeport, July 6.
Telea polyphemus, polyphemus moth.	Cocoon, New Haven, Mar. 19; adults, Hamden, June 19; New Britain, June 29; Cheshire, Aug. 1.
Tibicen canicularis, a cicada or dog-day harvest fly.	Adult, New Haven, July 30.
Tibicen lyricen, a cicada or dog-day harvest fly.	Adult and pupa shell, Woodbury, July 17; adult, New Haven, July 30.
Tolype velleda, a lappet moth.	Larvae, Middletown, July 5; Danielson, Aug. 1.
Tropaea luna, luna moth.	Cocoon, Madison, Dec. 7, 1934.
Xanthogramma flavipes, a Syrphid fly.	Adults from decayed wood, Bridgeport, July 6.

CONFERENCE OF CONNECTICUT ENTOMOLOGISTS

The twelfth annual conference of entomologists working in Connecticut was held in the Assembly Room at the Connecticut Agricultural Experiment Station, New Haven, on Thursday, October 24, 1935. Dr. R. B. Friend was elected chairman, and 77 persons were present. Luncheon, consisting of a New England boiled dinner, was served by members of the Entomology Department staff.

The following program was carried out:

Greeting, Director William L. Slate, New Haven

Some Entomological Features of 1935, Dr. W. E. Britton, New Haven

Notes on a Japanese Weevil, *Calomycterus setarius* Roelofs, in Connecticut, M. P. Zappe, New Haven

The European Spruce Sawfly in the Northeast (lantern slides), Dr. H. J. MacAloney, New Haven

The European Earwig as a Pest in Rhode Island, Dr. A. E. Stene, Kingston, R. I.

The Present Gypsy Moth Situation, A. F. Burgess, Greenfield, Mass.

Progress in Dutch Elm Disease Eradication, L. H. Worthley, White Plains, N. Y.

Progress of Elm Tree Sanitation in Connecticut with Relief Funds, W. O. Filley, New Haven

Notes on *Hylurgopinus rufipes* Eich. (lantern slides), Dr. B. J. Kaston, New Haven

Luncheon

Inspection of Department of Entomology: exhibits, collection, library and parasite rooms

Demonstration (Room 12, Jenkins Laboratory) of new method of inflating larvae, G. H. Plumb, New Haven

Recent Developments in Sprays for the Control of the European Corn Borer, Dr. C. H. Batchelder, New Haven

Termite Damage to Buildings in Connecticut (lantern slides), N. Turner, New Haven

The Spruce Gall Aphid: Relationship Between the Hibernating Females and the Survival of the Spring Generation (lantern slides), Dr. R. B. Friend, New Haven

The Relationship of Insects and Plants in Gall Production (lantern slides), Dr. E. P. Felt, Stamford

Notes on Rearing the Apple Maggot and Certain Parasites of the Oriental Fruit Moth (lantern slides), Dr. Philip Garman, New Haven

Progress of Mosquito Elimination in Connecticut by the Use of Relief Funds (lantern slides), R. C. Botsford, New Haven

INSPECTION OF NURSERIES, 1935

W. E. Britton and M. P. Zappe

The annual inspection of nurseries as provided in Section 2136 of the General Statutes was commenced July 1, and was in charge of Mr. Zappe, who was assisted during July and August as in preceding years by A. F. Clark, W. T. Rowe and R. J. Walker. By September 1, most of the larger nurseries had been inspected and Mr. Zappe inspected the remaining ones during September, but was assisted in a few special cases by Neely Turner, R. C. Botsford and G. H. Plumb. A few nurseries were again visited to make sure that the pests had been eradicated.

In general the nurseries were in fully as good condition as in 1934, although some had been neglected. Because of the two severe winters and the cutting and burning of infested shoots, the European pine shoot moth was much less prevalent than in 1933 and was about the same as in 1934. The pine needle scale was also less prevalent than in 1934. In 1935 there were 16 nurseries in which no pests were found. Altogether there were about 88 different insect pests and 58 different plant diseases found in nurseries, in both cases a smaller number than in 1934. These pests cannot all be mentioned here but some of the more important pests that may be carried on nursery stock are shown, with their records for the past 10 years, in the following table:

Table 1. Ten-Year Record of Certain Nursery Pests

Pest	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935
Oyster-shell scale	39	45	57	78	86	73	68	78	104	93
San José scale	19	16	30	22	8	11	10	13	19	17
Spruce gall aphids[1]	42	82	120	147	99	124	141	231	244	285
White pine weevil	8	17	19	37	66	74	70	61	67	98
Pine needle scale	5	6	13	13	10	20	26	46	66	42
European pine shoot moth	0	1	7	7	17	32	77	137	120	121
Poplar canker	32	39	35	37	35	23	40	34	39	28
Pine blister rust	9	9	5	7	7	13	12	11	7	2
Nurseries uninfested	46	37	18	13	18	32	24	22	21	16
Number of nurseries	162	191	228	266	302	327	351	362	381	373

Number and Size of Nurseries

The list of nurserymen for 1935 contains 373 names, a decrease of eight from 1934. A classification on account of size may be indicated as follows:

[1]Includes both *Adelges abietis* and *Gillettea cooleyi*.

Area	Number	Percentage
50 acres or more	20	5
10 acres to 49 acres	38	10
5 acres to 9 acres	33	9
2 acres to 4 acres	93	25
1 acre or less	189	51
	373	100

Of the 373 nurseries listed for 1935, five new nurseries registered during the winter and were inspected before the spring shipping season and again in late summer. These nurseries are marked "(2)" after the name because each was given two inspections and received two certificates during the year. Five nurserymen holding certificates in 1934 failed to register before July 1, 1935, and as provided in Section 2137 of the General Statutes, were required to pay the costs of inspection. Consequently, the sum of $25 was collected from them and turned over to the Treasurer of the Station to be deposited in the State Treasury.

The area of Connecticut nurseries receiving certificates in 1935 is 4,779 acres, an increase of 120 acres over 1934. Altogether 18 new names have been added and 26 have discontinued business, either temporarily or permanently, since last year. Fifteen nurseries on the list for 1934 are now included under different names. The nursery list for 1935 contains 373 names, a decrease of eight from that of last year. The nursery firms granted certificates in 1935 are as follows:

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935

Name of firm	Address	Acreage	Certificate date	Certificate number
Ackerman, H. S.	West Hartford	2	Aug. 17	2925
Adamec Nursery, George	East Haven	1	Sept. 12	3044
Aldrich Gardens	Guilford	1	Sept. 14	3060
Allara, Emanuel	Hamden	1	Sept. 3	2994
Allen, Henry L.	Pawcatuck	1	Aug. 12	2895
Amelunxen & DeWyn	Yalesville	4	Aug. 31	2989
Anderson Avenue Nursery	West Haven	1	Sept. 4	3005
Andover Gardens	Andover	1	Aug. 23	2943
Anstett Nursery, Louis	Norfolk	2	Sept. 23	3105
Arnold of Orange Nursery	Orange	1	Aug. 9	2888
Artistree Nursery	Branford	3	Sept. 25	3113
Aunt Cotton's Nursery	Westport	1	Nov. 6	3197
Austin, M. E.	Clinton	1	Aug. 24	2950
Baldwin, Linus	Middletown	1	Sept. 27	3124
Banak Nursery	Rockville	2	July 12	2846
Barnes Bros. Nursery Co., The	Yalesville	215	Aug. 21	2938
Bartolotta, M. S.	Cromwell	1	Aug. 12	2909
Barton Nursery	Hamden	1	Sept. 18	3076
Beach, Roy G.	Forestville	1	Aug. 6	2878
Beattie, W. H.	New Haven	1	Sept. 6	3013
Bedford Gardens	Plainville	1	Sept. 18	3081
Beers, H. P.	Southport	1	Dec. 31	3210
Benbow, Abram	Norfolk	1	Sept. 11	3039

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Berg, Fred	Stamford	4	Sept. 14	3058
Berkshire Gate Nurseries	Danbury	1	Sept. 7	3023
Bertolf Bros., Inc.	Old Greenwich	45	Aug. 30	2984
Blue Hills Nurseries	Avon	26	Sept. 4	3000
Boggini, Louis	South Manchester	1	Sept. 27	3123
Bolton Perennial Gardens	Bolton	1	Aug. 7	2882
Bonnie Brook Gardens	Rowayton	2	Oct. 29	3190
Booy, H. W.	Yalesville	4	Aug. 12	2907
Boxwood Manor	Old Lyme	1	Aug. 15	2917
Brack Nursery	Brookfield	1	Aug. 7	2883
Brainard Nursery & Seed Co.	Thompsonville	14	July 26	2861
Brandriff Rock & Perennial Gardens	Branford	1	Sept. 17	3075
Branford Nurseries	Branford	6	Oct. 1	3138
Bretschneider, A.	Danielson	1	Aug. 21	2940
Bridgeport Hydraulic Co.	Bridgeport	15	July 29	2867
Brimfield Gardens Nursery	Wethersfield	8	Sept. 4	2999
Bristol Nurseries, Inc.	Bristol	65	Aug. 1	2873
Brooklawn Conservatories, Inc.	Bridgeport	1	Aug. 28	2966
Brooklawn Nursery	Bridgeport	2	Oct. 19	3174
Brooks the Florist	West Haven	1	Dec. 2	3198
Brouwer's Nurseries	New London	20	Aug. 24	2951
Brouwer's Nurseries, Peter	New London	3	Aug. 23	2946
Bulpitt, Henry F.	Darien	5	Sept. 3	2991
Bureau of Trees	New Haven	7	Sept. 16	3065
Burke the Florist	Rockville	1	July 23	2852
Burnetts' Corners Farm	Mystic	2	Aug. 12	2896
Burr, Morris L.	Westport	1	Aug. 17	2931
Burr & Co., Inc., C. R.	Manchester	500	July 12	2843
Burwell, E. E.	New Haven	1	Oct. 2	3142
Busch, A. H.	Greenwich	1	Aug. 31	2990
Byram Evergreen Nursery	East Port Chester	1	Sept. 4	2998
Candee, Hollis S.	Hartford	1	Sept. 21	3100
Cant, Alexander	Springdale	1	Sept. 13	3056
Cardarelli, Emilio J.	Cromwell	5	Aug. 15	2919
Carlson, John B.	Newington	1	Sept. 24	3110
Case, Mrs. Louis L.	Simsbury	1	Sept. 18	3083
Cherry Hill Nursery Co.	Rockfall	50	July 27	2866
Chesman, Joseph	East Haven	1	Sept. 6	3014
Chiapperini, Michele	Groton	1	Aug. 12	2898
Chippendale Nurseries, Inc.	Old Lyme	2	Dec. 4	3200
Choate School, The	Wallingford	4	Oct. 9	3158
City Line Florist	Bridgeport	1	Oct. 18	3171
Clark, Raymond H.	Milford	1	Oct. 16	3167
Cleary's Gardens	Bethel	1	July 29	2868
Clinton Nurseries	Clinton	90	Oct. 24	3184
Clyne Nurseries	Waterbury	6	Nov. 6	3196
Coley, H. W.	Westport	1	Aug. 22	2942
Collington, E. H.	West Mystic	1	Aug. 12	2897
Conine Nursery Co.	Stratford	75	Aug. 7	2881
Conn. Agr. Expt. Sta. (W. O. Filley, Forester)	New Haven	3	Sept. 7	3019
Conn. Forestry Dept.	Hartford	5	Sept. 18	3088
Conn. Forestry Nurseries	Deep River	17	Sept. 20	3098
Conn. State College (S. P. Hollister)	Storrs	1	Aug. 28	2963
Conn. State Highway Dept.	Hartford	18	Sept. 28	3132
Conn. Valley Nurseries	East Hartford	1	Sept. 27	3127
Conn. Valley Nurseries	Manchester	25	July 23	2854

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Corrigan's West Haven Nurseries	West Haven	1	Sept. 14	3062
Couture, E. R.	Westport	2	Aug. 21	2939
Covey, Mrs. Arthur	Harwinton	1	Aug. 28	2964
Cragholme Nurseries, Inc.	Greenwich	2	Aug. 28	2965
Cromie, G. A.	New Haven	2	Sept. 18	3079
Cronamere Alpine Nurseries, Inc.	Greens Farms	3	Sept. 3	2992
Culver, W. B.	Suffield	1	Sept. 9	3031
Curtiss, C. F.	Plantsville	2	Dec. 9	3201
Daisy Hill Gardens	Derby	1	Sept. 19	3092
Dallas, Inc., Alexander	Waterbury	2	Oct. 7	3150
Damen, Peter J.	East Haven	2	Sept. 23	3106
Darien Nurseries	Darien	6	Aug. 30	2975
Dawson, Florist	Willimantic	1	Sept. 30	3135
Daybreak Nurseries	Westport	3	Sept. 13	3050
Dearden Bros.	East Hartford	4	Sept. 27	3126
DeMars, F. H.	Winsted	1	Sept. 11	3036
Devon Nursery	Devon	1	Oct. 11	3163
Dewey's Greenhouses	Groton	2	Sept. 18	3078
Dietrich, Benjamin	Greenwich	4	Oct. 17	3169
Dillon, Thomas	Greenwich	1	Aug. 28	2961
Dingwall, Joseph N.	West Haven	1	Sept. 17	3072
Doane, David F.	Haddam	1	Aug. 24	2949
Doebeli, Charles A.	Bridgeport	1	Oct. 22	3178
Donovan, Daniel H.	Talcottville	1	July 26	2862
Dunlap's Dollar Evergreens	Cromwell	3	Aug. 30	2978
Dunn, James F.	Stamford	4	Oct. 16	3165
Eager, Edward M.	Bridgeport	1	Sept. 7	3021
Edendale Gardens	Winsted	1	Sept. 11	3037
Edgewood Nurseries	New Haven	1	Sept. 17	3071
Elfgren Nurseries	East Killingly	3	Aug. 27	2952
Ellington Evergreen Nursery	Ellington	5	Nov. 4	3193
Elm City Nurseries	New Haven	1	Aug. 15	2920
Elmgren, C. J.	Cromwell	1	Oct. 9	3159
Elm Grove Cemetery Association	Mystic	1	Aug. 27	2954
Evergreen Nursery Co.	Wilton	30	July 25	2860
Eyberse's Nursery	Norwich	1	Dec. 31	3208
Fairway Gardens	Woodmont	1	Aug. 31	2987
Farmington Valley Nursery	Avon	5	Sept. 21	3099
Fernhill Nursery	Hartford	3	Aug. 17	2926
Fletcher, Walter G.	Guilford	5	Sept. 28	3131
Flower City Rose Co.	Manchester	12	July 23	2855
Follett Nursery	Westport	10	Sept. 5	3010
Folly Farm, Inc., The	Greens Farms	1	Aug. 13	2910
Ford, George R.	Hartford	10	Sept. 26	3120
Fraser's Nurseries & Dahlia Gardens	Willimantic	3	Aug. 27	2953
Frede, Frederick	Danbury	1	Sept. 12	3045
Galligan, C. W.	New Haven	1	Dec. 12	3202
Gallup, Amos M.	Pawcatuck	1	Aug. 12	2899
Garden of Romance	Old Saybrook	2	Sept. 7	3020
Gardner's	Berlin	1	Sept. 24	3111
Gardner's Nurseries	Rocky Hill	250	Sept. 7	3022
Geduldig's Nurseries	Norwich	6	Aug. 30	2977
Giant Valley Nursery	Mount Carmel	1	July 24	2857
Gilbert, Henry G.	Danielson	2	Dec. 17	3203
Glastonbury Gardens	Glastonbury	3	Sept. 20	3096

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Glenbrook Greenhouses	Glenbrook	2	Sept. 11	3042
Glen Terrace Nurseries	Hamden	60	Aug. 16	2922
Golden Hill Nurseries	Shelton	3	Sept. 13	3061
Goodwin Nurseries	Bloomfield	7	Aug. 13	2913
Goshen Nurseries	Goshen	6	Aug. 8	2887
Green, Wm. P. (2)	South Windsor	3	Sept. 27	3128
Green Acre Farms, Inc.	Waterford	1	Aug. 12	2900
Grillo, Florist, N.	Milldale	1	July 12	2841
Griswold, George	Old Lyme	1	Aug. 15	2918
Gunn, Mrs. Charles	Kent	1	Sept. 26	3119
Haas, Florist, Emil	Milford	1	Sept. 25	3114
Hall, Henry A. L.	West Haven	1	Sept. 4	3004
Hamden Nursery	Hamden	1	Sept. 16	3069
Hammonassett Gardens	Madison	3	Sept. 27	3129
Hansen, Florist & Nursery	Fairfield	5	Aug. 28	2967
Happy Days Farm	Norwalk	10	Oct. 7	3151
Hearn, Thomas H.	Washington	3	Oct. 11	3164
Heath & Co.	Manchester	15	July 12	2845
Henninger, Christopher	New Britain	1	Sept. 18	3082
Hildebrand's Nursery	Norwich	1	Oct. 25	3186
Hilding Bros. (2)	Amston	1	Aug. 20	2937
Hillcrest Gardens	Woodbridge	3	Oct. 1	3139
Hilliard, H. J.	Sound View	1	Aug. 12	2901
Hinckley Hill Nursery, Inc.	Stonington	1	Aug. 12	2902
Hiti Nurseries	Pomfret Center	11	Aug. 14	2915
Hofmann, Henry F.	Cromwell	1	Aug. 1	2874
Holcomb, Ernest L.	Granby	1	Sept. 18	3086
Holcomb's Evergreen Nursery	Winsted	4	Sept. 16	3068
Holdridge & Sons, S. E.	Norwich	3	Aug. 12	2893
Hope Street Nursery	Springdale	1	Sept. 13	3055
Horan, James F.	Hartford	1	Aug. 19	2933
Horan, Kieran W.	West Hartford	1	Aug. 16	2923
Horowitz, Ben	East Hampton	1	Aug. 12	2892
Houston's Nurseries	Mansfield Depot	13	Oct. 3	3145
Hoyt, Charles E.	Bethel	40	Aug. 10	2891
Hoyt's Sons Co., Inc., Stephen	New Canaan	500	Aug. 1	2875
Hurlburt Nursery (2)	Hamden	1	Sept. 18	3080
Jennings, Mrs. George S.	Southport	2	Aug. 27	2955
Johnson, Tom	Stratford	1	Sept. 25	3116
Kately, Milton M.	East River	1	Sept. 14	3059
Kelley & Son, James J.	New Canaan	6	Sept. 4	3008
Kellner, A. H.	Norwalk	1	Sept. 13	3057
Keogh, H. W.	Norwalk	2	Nov. 6	3195
Keser's Sons, Inc., Otto	Portland	1	Sept. 12	3048
Key Rock Gardens	Newtown	2	Sept. 13	3051
Keystone Nurseries	Danbury	1	Aug. 30	2980
Lanedale Farm Nursery	New Canaan	10	Oct. 25	3185
Langstroth Conifer Nursery	Danbury	6	Aug. 13	2912
Laviola, Cosmo	New Haven	1	Sept. 23	3109
Lawrence Greenhouses	Branford	1	Dec. 18	3205
Leghorn's Evergreen Nurseries	Cromwell	27	Aug. 28	2969
Lemmon, Robert S.	New Canaan	1	Aug. 29	2973
Lewis Gardening Service	Kensington	1	Sept. 20	3094
Lewis & Valentine, Inc. (Construction Dept.)	Darien	9	Aug. 28	2962

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Lowescroft Gardens	Manchester	1	July 12	2842
Luckner, Jr., Wm.	Stepney	1	Sept. 19	3093
Machia, Julia	Milford	1	Aug. 2	2876
Malleable Iron Nursery	Branford	2	Oct. 2	3143
Mallett Nursery	Bridgeport	6	Oct. 1	3140
Maplewood Nursery Co.	Norwich	2	Dec. 4	3199
Marigold Farm Nursery	New Canaan	20	Sept. 9	3030
Massacoe Nursery	Simsbury	1	Sept. 18	3085
Mather Homestead	Darien	1	Sept. 23	3107
Mayapple Nursery	Stamford	1	Sept. 21	3101
McCarthy, John P.	Danbury	1	Sept. 10	3032
McConville's Greenhouses and Nursery	Manchester	2	July 15	2848
Meier, A. R.	West Hartford	1	Sept. 30	3136
Melville Nurseries	Fairfield	1	Sept. 13	3053
Merwin Lane Nursery	East Norwalk	3	Sept. 4	2997
Meyer, Carl H. H.	Riverside	10	Aug. 27	2959
Meyer Nursery, Ludwig	Bridgeport	4	Sept. 25	3117
Middeleer, Inc.	Darien	28	Oct. 19	3176
Midvale Nursery	Manchester	1	Dec. 31	3209
Milford Flower Gardens	Milford	1	Oct. 7	3149
Milford Nursery	Milford	2	July 30	2871
Miliano, S.	Woodmont	1	Sept. 28	3134
Millane Nurseries & Tree Experts, Inc.	Cromwell	35	Aug. 15	2916
Mill River Nursery	Fairfield	15	July 24	2858
Millstone Garden	Terryville	1	July 20	2851
Minge, G. H.	Rocky Hill	1	Sept. 4	2995
Montgomery Evergreen Nursery, Inc.	Cos Cob	5	Sept. 4	2996
Moraio Bros.	Old Greenwich	5	Sept. 14	3063
Morgan, Wm. F.	North Stonington	3	Aug. 12	2903
Mountain Farm Nursery	West Hartford	2	Aug. 30	2979
Mountain Grove Cemetery Association	Bridgeport	1	Oct. 3	3146
Mount Airy Gardens	Stamford	1	Oct. 31	3191
Mount Carmel Nursery	Mount Carmel	1	Sept. 9	3025
Munro, Charles	New Haven	1	Oct. 1	3141
Newell Nurseries	Bloomfield	6	Aug. 10	2890
New Haven Park Commission	New Haven	10	July 24	2856
Newington Gardens & Nurseries	Newington Junction	1	Sept. 12	3047
New London Cemetery Association	New London	1	Aug. 17	2927
New London County Nurseries	New London	5	Sept. 12	3046
Newton's Nursery	West Granby	1	Sept. 18	3084
New York, New Haven & Hartford R. R. Co.	Bridgeport	4	Sept. 13	3054
Niantic Bouquet Shop	Niantic	1	Aug. 31	2986
North Avenue Nursery	Bridgeport	1	Sept. 11	3033
North-Eastern Forestry Co.	Cheshire	96	July 30	2872
Northville Gardens	New Milford	1	Aug. 30	2982
Nyveldt, Albert	New London	1	Aug. 12	2894
Oakland Nurseries	Ellington	40	July 12	2844
Oakwood Novelty Gardens	East Hartford	1	Oct. 10	3161
Oldfield Nursery	Stratford	1	Oct. 9	3157
Old House Gardens, The	Yalesville	1	Sept. 23	3102
Old Orchard Nursery	Norwalk	4	July 23	2853

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Outpost Nurseries, Inc.	Ridgefield	635	Aug. 6	2880
Ouwerkerk, D. K.	Yalesville	10	Aug. 20	2935
Over-the-Garden-Wall	West Hartford	3	Aug. 24	2948
Ox Yoke Farm Nurseries	Bridgeport	1	Oct. 4	3147
Palmieri Nursery & Florist	New Haven	1	Sept. 23	3103
Park Place Nurseries	Marion	2	Oct. 8	3155
Paton, Wm. D.	Mount Carmel	2	July 30	2869
Patrick, Charles	Bridgeport	2	Aug. 29	2971
Peatt, Wm. T.	Ridgefield	1	Aug. 14	2914
Pedersen, Anthon	Stamford	3	Sept. 6	3018
Pendleton's Flower Garden	Norwich	1	May 31	2840
Pequot Florist, Andrew Beran	New London	1	Aug. 12	2904
Peschko, Robert	Danbury	1	Sept. 16	3067
Pestretto, Frank	West Hartford	1	Aug. 17	2928
Pestretto, Salvatore	Hartford	1	Aug. 19	2934
Pflomm, Charles	Bridgeport	1	Sept. 25	3115
Pflomm, George	Bridgeport	5	Sept. 4	3009
Piccionelli, Tony	East Haven	1	Sept. 17	3074
Piemontese, Dominick	East Haven	1	Sept. 6	3015
Pierson, Inc., A. N.	Cromwell	250	Aug. 9	2889
Pinatello, Angeline	East Hartford	4	Oct. 9	3160
Pinchbeck Bros., Inc.	Ridgefield	10	Sept. 11	3041
Pinecrest Gardens	Wapping	1	Sept. 27	3125
Pine Plains Greenhouse, Inc.	Norwich	2	Aug. 27	2958
Polish Orphanage Farm	New Britain	1	Sept. 30	3137
Pomeroy Blue Spruce Gardens	New Milford	5	Sept. 3	2993
Prospect Nurseries, Inc.	Cromwell	25	Aug. 29	2972
Quinebaug Forestry Co.	Stafford Springs	2	July 12	2847
Rabinak, Louis	Deep River	3	Aug. 29	2970
Race Brook Gardens, Inc.	Orange	1	Sept. 19	3091
Reliable Nursery, The	East Hartford	2	Oct. 7	3152
Rengerman's Garden	Granby	1	Sept. 18	3087
Reveley, F. J.	Clinton	2	Sept. 20	3095
Reynolds' Farms	South Norwalk	1	July 26	2863
Richmond, Gordon L.	New Milford	15	Sept. 25	3112
Ridgewood Nurseries	Milford	1	Aug. 17	2932
Rockfall Nursery Co.	Rockfall	45	July 27	2865
Rose Hill Nursery	Gildersleeve	3	Oct. 23	3181
Russell St. Perennial Gardens	South Manchester	1	Sept. 27	3122
Sachem Forest Landscape Service	New Haven	1	Sept. 17	3073
Sage Brothers	North Woodbury	1	Aug. 17	2929
Sakson's Nursery	Greenwich	1	Sept. 6	3016
Sandelli Greenhouses	New Britain	1	Oct. 5	3148
Sasco Hill Nursery	Southport	1	July 30	2870
Saxe & Floto	Waterbury	1	Oct. 7	3154
Scarano Nursery, Alphonse	Groton	1	Aug. 20	2936
Schaeffer, Peter	Norwich	4	Aug. 16	2924
Schafrik, George H.	Meriden	1	Oct. 26	3189
Schaghticoke Farm Nursery	Bridgewater	8	Sept. 12	3043
Schleichert Florist & Nursery	Bridgeport	1	Aug. 23	2945
Schneider, Adolf (2)	Milford	1	Oct. 21	3177
Schneider, Godfrey	West Haven	1	Sept. 4	3006
Schuller, John	Higganum	2	Sept. 12	3049
Schulze, Charles T.	Bethel	3	Sept. 4	3001
Schulze, Edward E.	Bethel	1	Aug. 13	2911

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Scott Nursery, J. M.	Woodbury	1	May 23	2839
Scott's Nurseries	Bloomfield	10	Aug. 22	2941
Selleck, Joel F.	Nichols	1	Sept. 27	3130
Seltsam's Pequonnock Gardens	Bridgeport	1	Oct. 16	3166
Seymour Gardens, Prudence	New Milford	1	Aug. 30	2983
Seymour's Hemlock Nursery	Riverton	1	Sept. 11	3038
Sharon Valley Nursery	Sharon	1	Sept. 11	3040
Silver City Nursery	Meriden	3	Sept. 23	3108
Silvermine Nurseries	Norwalk	1	July 19	2850
Simonsen, H. C.	Plainville	3	Sept. 9	3026
Sipocz Arrowhead Farm	Fairfield	1	Sept. 26	3118
Smith & Son, Edward A.	Mystic	1	Aug. 12	2905
Soltes Nursery, M. J.	Shelton	2	Oct. 2	3144
Southington Nursery, Inc.	Southington	25	Aug. 28	2968
Southport Nursery	Southport	35	Aug. 30	2976
South Wilton Nurseries	Wilton	5	Aug. 2	2877
Spring Nurseries	Bristol	1	Aug. 12	2908
Stack, Charlotte E.	New Milford	1	Aug. 30	2981
Stafford Conservatories	Stafford Springs	2	July 19	2849
Stalzer & Son, John	Brooklyn	1	Sept. 9	3024
Stannard, E. H.	Wilton	2	Sept. 28	3133
State Street Nursery	Hamden	2	Sept. 17	3070
Steck Nursery	Bethel	4	Dec. 31	3207
Steck, Sarah B.	Bethel	1	Aug. 6	2879
Steck & Sons, C. A.	Newtown	20	Oct. 22	3180
Steele Nurseries, Charles	Greenwich	2	Sept. 6	3017
Stratfield Nurseries	Fairfield	50	Oct. 25	3188
Strayer, Paul	Stratford	1	Oct. 8	3156
Sunridge Nurseries	Greenwich	75	Sept. 11	3034
Thomas & Sons, Inc., W. D.	Hamden	1	Sept. 4	3002
Thomson Co., W. W.	West Hartford	4	Oct. 18	3172
Torizzo, P. A.	West Hartford	5	Aug. 27	2957
Tower Crispette Co.	Guilford	1	Oct. 31	3192
Tow Path Gardens, Inc.	Hartford	15	Sept. 16	3064
Triangle Nursery	Yalesville	2	Sept. 9	3029
Twin Pines Gardens	New Milford	1	Aug. 30	2985
Uplands Flower Gardens	Woodbury	1	Aug. 17	2930
Valley View Nursery	Southington	1	Oct. 19	3175
Van der Bom, F.	Bethel	5	Aug. 15	2921
Vanderbrook & Son, C. L.	Manchester	51	July 25	2859
Van Wilgen, Wm.	Branford	1	Sept. 27	3121
Van Wilgen Nurseries	Branford	22	Oct. 22	3179
Vasileff Nurseries	Greenwich	4	Sept. 5	3011
Verkade's Nurseries	New London	60	Aug. 23	2944
Vernick, John H.	Bridgeport	2	Oct. 17	3170
Wallace Nursery	Wallingford	5	Sept. 9	3028
Wallingford Nurseries of the Barnes Nursery & Orchard Co.	Wallingford	75	Oct. 25	3187
Waltermire & Sons, W. H.	Guilford	1	Dec. 18	3204
Ward & Son, J. F.	Windsor	1	Aug. 8	2886
Water Bureau of the Metropolitan District	Hartford	50	Oct. 7	3153
Watertown Nurseries, Inc.	Watertown	1	Aug. 27	2956
Wayside Farm Gardens	Thomaston	2	Aug. 8	2884
Weinberger, Wm.	Ridgefield	2	Sept. 9	3027

CONNECTICUT NURSERY FIRMS CERTIFIED IN 1935—(*Continued*)

Name of firm	Address	Acreage	Certificate date	Certificate number
Westerly Nursery	Pawcatuck	2	Aug. 24	2947
West Mountain Farm	Ridgefield	3	Oct. 23	3182
Westover Nurseries	Stamford	1	Aug. 31	2988
Westville Nurseries, Inc.	New Haven	3	Nov. 4	3194
Wethersfield Nursery	Wethersfield	2	Aug. 28	2960
Wheeler, Charles B.	Stonington	1	Aug. 12	2906
Whittemore Co., J. H.	Naugatuck	3	Sept. 11	3035
Wightman, Elton G.	Wethersfield	1	Dec. 19	3206
Wildflower Nursery, The	Brookfield	1	Oct. 23	3183
Wild's Nursery, Henry	Norwalk	30	Sept. 4	3007
Wilridge Nurseries	Ridgefield	5	Aug. 8	2885
Wilson Landscape Co. (2)	Hartford	1	Oct. 11	3162
Wilson, Michael L.	Litchfield	5	Sept. 23	3104
Wilson & Co., Inc., C. E.	Manchester	100	July 27	2864
Woodbridge Nurseries	New Haven	4	Oct. 16	3168
Woodcrythe	New Canaan	1	Aug. 29	2974
Woodmont Gardens	Woodmont	1	Sept. 4	3003
Woodmont Nurseries	Woodmont	110	Sept. 18	3077
Woodruff, C. V.	Orange	2	Sept. 19	3090
Wyllie, David	North Haven	1	Sept. 16	3066
Yacko, Stephen	Clinton	2	Sept. 5	3012
Yale University Forest School Nursery	New Haven	1	Sept. 13	3052
Yale University Landscape Department	New Haven	6	Sept. 19	3089
Young's Nurseries	Wilton	2	Oct. 18	3173
Zack Co., H. J.	Deep River	10	Sept. 20	3097
Zapodka, John	Manchester	1	Apr. 13	2835
Total	373 nurseries	4,779 acres		

The cost of inspecting these nurseries in 1935, including certain additional visits to make sure that pests had been eradicated, was approximately $1,700.

Other Kinds of Certificates Issued

During 1935, 169 duplicate certificates were issued to Connecticut nurserymen, to be filed in other states. Altogether, 113 dealer's permits were issued to registered dealers who do not grow the nursery stock that they sell. Shipper's permits to the number of 223 were issued to nurserymen in other states who wish to ship stock into Connecticut. Altogether, 437 parcels of nursery stock were inspected and certified for shipment to accommodate individuals.

Federal Quarantine No. 62 concerning narcissus bulbs was revoked, effective April 1, 1935. Nevertheless, certain states require similar inspection and certification, and 2,000 bulbs were inspected and 24 certificates issued. There were also issued 137 miscellaneous certificates and special permits, 126 blister rust control area permits, 125 corn borer certificates and 2,895 certificates for packages of shelled corn and other seeds, many of which were for foreign countries.

Inspection of Imported Stock

The nursery stock entering Connecticut from foreign countries in 1934-1935 involved a slightly larger number of shipments but a smaller number of plants than was imported in the preceding year. As in other years, this stock entered the United States under specifications and permits of the Federal Bureau of Entomology and Plant Quarantine, and at ports of entry was released for transit to destination points, where it was examined by state inspectors.

In 1934-1935 there were 25 shipments containing 106 separate cases, and 733,275 plants, all of which were rose stocks. The stock was inspected by Mr. Zappe and B. W. McFarland. This stock was imported by four commercial rose growers: One had 13 shipments, containing 532,000 plants; one had eight shipments, containing 140,000; one had three shipments containing 56,275; and one had one shipment, containing 5,000. This stock came from the following sources:

Country	No. shipments	No. plants
Holland	20	691,275
England	5	42,000
Total	25	733,275

This stock consisted of *Rosa manetti*, 728,275, and *Rosa multiflora*, 5,000 plants.

The time required to inspect this imported rose stock was equivalent to 14 days of work for one man, and together with the cost of travel (1,130 miles) and other necessary expenses, made a total cost of approximately $201.95. Reports of the 25 shipments inspected were sent to the Federal Bureau of Entomology and Plant Quarantine.

Results of Inspection

Of the 25 shipments inspected, seven shipments, or 28 per cent, were found infested with insects or plant diseases as follows:

Insects	
Emphytus cinctus Linn.	5 shipments
Lepidopterous pupae	2 "
Plant Diseases	
Crown gall	1 shipment

The crown gall and *Emphytus cinctus* were both found in the same shipment.

In addition to the rose stocks mentioned above, there were three shipments containing 32 dahlia tubers, one shipment containing 300 iris rootstocks and 13 shipments containing 426 pounds, four ounces of forest, shrub and evergreen seeds and 15,450 separate seeds of a palm, *Cocos weddeliana*, that were not inspected in Connecticut.

There were also 13 shipments of 1,576 crates, containing 186,010 pounds of onion sets, imported by three Connecticut seed firms. Of this quantity, 169,660 pounds came from Greece and 16,350 pounds were from Ontario, Canada. Only three shipments from Greece were inspected and these were found infested by the bulb mite, *Rhizoglyphus hyancinthi* Banks. Most of the onion sets were distributed to growers without inspection other than that given at ports of entry by inspectors of the United States Department of Agriculture.

INSPECTION OF APIARIES, 1935

W. E. Britton

The apiaries were inspected in 1935, in about the same manner as in former years. After 25 years of faithful and satisfactory service as an apiary inspector, Mr. A. W. Yates retired at the end of the season of 1934. In the spring of 1935, Mr. W. H. Kelsey of Bristol, an experienced beekeeper, was appointed apiary inspector to succeed Mr. Yates in the four northern counties of the State. Mr. H. W. Coley, who began as an apiary inspector at the same time as Mr. Yates in 1910, has continued ever since to cover the four southern counties of Connecticut. The total cost of inspection of apiaries in 1935 was $2,075.23, of which $824.53 was from the balance of the appropriation ending June 30, 1935, and $1,250.70 from the succeeding appropriation available after July 1, 1935.

In 1935, 1,333 apiaries containing 8,855 colonies were inspected, as against 1,429 apiaries and 7,128 colonies in 1934. The average number of colonies per apiary in 1935 was 6.64 in comparison with 4.98 colonies in 1934. No European foulbrood was discovered in 1935, but American foulbrood was found in 84 apiaries and in 209 colonies, and although it occurred in every county in the State, was more prevalent in Fairfield, Hartford and Litchfield counties than elsewhere.

Table 2 shows the number of apiaries and colonies inspected, the average number of colonies per apiary, and the average cost of inspecting each apiary and colony for each year since inspection began in 1910.

Table 2. Twenty-Six Year Record of Apiary Inspection in Connecticut

Year	Number apiaries	Number colonies	Average No. colonies per apiary	Average cost of inspection	
				Per apiary	Per colony
1910	208	1,595	7.6	$2.40	.28
1911	162	1,571	9.7	1.99	.21
1912	153	1,431	9.3	1.96	.21
1913	189	1,500	7.9	1.63	.21
1914	463	3,882	8.38	1.62	.19
1915	494	4,241	8.58	1.51	.175
1916	467	3,898	8.34	1.61	.19
1917	473	4,506	9.52	1.58	.166
1918	395	3.047	7.8	1.97	.25
1919	723	6,070	11.2	2.45	.29
1920	762	4,797	6.5	2.565	.41
1921	751	6,972	9.2	2.638	.24
1922	797	8,007	10.04	2.60	.257
1923	725	6,802	9.38	2.55	.27
1924	953	8,929	9.4	2.42	.25
1925	766	8,257	10.7	2.45	.22
1926	814	7,923	9.7	2.35	.24
1927	803	8,133	10.1	2.37	.234
1928	852	8,023	9.41	2.12	.225
1929	990	9,559	9.55	2.19	.227
1930	1,059	10,335	9.76	2.01	.206
1931	1,232	10,678	8.66	1.83	.212
1932	1,397	11,459	8.2	1.60	.195
1933	1,342	10,927	8.1	1.69	.208
1934	1,429	7,128	4.98	1.40	.28
1935	1,333	8,855	6.64	1.556	.234

In 1935, apiaries were inspected in 149 towns. Inspections were made in 1935 in the following two towns not visited in 1934:

New London County: Lyme; Hartford County: Hartford.

On the other hand, in the following 17 towns visited in 1934, no inspections were made in 1935:

Fairfield County: Newtown, Weston; New Haven County: Bethany, Prospect, Wolcott, Woodbridge; New London County: Old Lyme; Litchfield County: Cornwall; Tolland County: Andover, Bolton, Columbia, Union; Windham County: Canterbury, Pomfret, Scotland, Sterling, Windham.

There were three apiaries infected with sacbrood and 84 apiaries infected with American foulbrood.

In 1935, American foulbrood was discovered in the following 47 towns:

Fairfield County: Bethel, Brookfield, Danbury, Easton, Fairfield, Greenwich, Ridgefield, Sherman, Trumbull, Wilton; New Haven County: Cheshire, Hamden, Naugatuck, Wallingford, Waterbury; Middlesex County: Middlefield, Portland; New London County: North Stonington, Norwich, Preston, Stonington; Litchfield County: Harwinton, Litchfield, Plymouth, Roxbury, Thomaston, Washington, Watertown, Winchester; Hartford County: Berlin, Bloomfield, Burlington, Canton, East Granby, Farmington, Glastonbury, Manchester, New Britain, Newington, Plainville, Simsbury, Southington, West Hartford, Windsor; Tolland County: Ellington, Vernon; Windham County: Putnam.

Statistics of Inspection

The statistics of apiary inspection by towns and counties are given on the following pages, with summary on page 284.

INSPECTION OF APIARIES, 1935

Town	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
Fairfield County				
Bethel	13	1	64	2
Bridgeport	4	—	23	—
Brookfield	3	1	8	1
Danbury	19	1	118	1
Darien	1	—	16	—
Easton	7	2	49	11
Fairfield[1]	9	1	65	1
Greenwich	16	1	132	2
Monroe	9	—	85	—
New Canaan[2]	5	—	37	—
New Fairfield	14	—	72	—
Norwalk	4	—	24	—
Redding[1]	6	—	35	—
Ridgefield	10	1	70	2
Shelton	3	—	38	—
Sherman	8	1	57	1
Stamford	1	—	4	—
Stratford	4	—	22	—

[1]One apiary inspected twice.
[2]Three colonies with sacbrood.

Town	Apiaries		Colonies	
	Inspected	Diseased (Am. f. b.)	Inspected	Diseased (Am. f. b.)
Fairfield County—Continued				
Trumbull	19	1	110	2
Westport	6	—	42	—
Wilton	10	1	153	2
	171	11	1,224	25
New Haven County				
Ansonia	4	—	22	—
Branford	4	—	32	—
Cheshire	7	1	56	1
East Haven	2	—	11	—
Guilford	6	—	36	—
Hamden	8	3	46	10
Madison	3	—	8	—
Meriden	10	—	114	—
Middlebury	1	—	8	—
Milford	4	—	52	—
Naugatuck	2	1	12	2
New Haven	2	—	8	—
North Branford	4	—	59	—
North Haven	4	—	34	—
Orange	5	—	76	—
Oxford	7	—	56	—
Seymour	4	—	15	—
Southbury	3	—	143	—
Wallingford	10	2	249	8
Waterbury	1	1	4	4
West Haven	1	—	6	—
	92	8	1,047	25
Middlesex County				
Chester	6	—	34	—
Clinton	6	—	55	—
Cromwell	10	—	77	—
Durham	10	—	102	—
East Haddam	5	—	55	—
East Hampton	11	—	119	—
Essex	13	—	57	—
Haddam	6	—	56	—
Killingworth	3	—	15	—
Middlefield	5	1	109	5
Middletown	17	—	115	—
Old Saybrook	11	—	45	—
Portland	14	1	80	1
Saybrook	6	—	56	—
Westbrook	4	—	53	—
	127	2	1,028	6
New London County				
Bozrah	1	—	14	—
Colchester	20	—	199	—
East Lyme	12	—	108	—
Franklin	2	—	6	—
Griswold	4	—	67	—
Groton	13	—	78	—
Lebanon	11	—	155	—

Town	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
New London County—Continued				
Ledyard	5	—	32	—
Lisbon	2	—	21	—
Lyme	9	—	95	—
Montville	5	—	62	—
New London	4	—	30	—
North Stonington	7	1	38	4
Norwich	13	5	469	23
Preston	4	1	33	3
Salem	3	—	30	—
Sprague	4	—	40	—
Stonington	10	1	57	1
Voluntown	1	—	0	—
Waterford	11	—	85	—
	141	8	1,619	31
Litchfield County				
Barkhamsted	8	—	20	—
Bethlehem	4	—	65	—
Bridgewater	5	—	57	—
Canaan	2	—	9	—
Colebrook	6	—	29	—
Goshen	4	—	24	—
Harwinton	8	1	29	1
Kent	8	—	63	—
Litchfield	12	2	123	11
Morris	8	—	26	—
New Hartford	13	—	35	—
New Milford	29	—	183	—
Norfolk	6	—	15	—
North Canaan	6	—	72	—
Plymouth	11	1	60	3
Roxbury[2]	9	1	27	2
Salisbury	9	—	52	—
Sharon	16	—	122	—
Thomaston	7	2	27	2
Torrington	22	—	84	—
Warren	1	—	1	—
Washington[1]	16	2	68	6
Watertown	17	2	107	3
Winchester	15	4	57	7
Woodbury	7	—	48	—
	249	15	1,403	35
Hartford County				
Avon	8	—	33	—
Berlin	22	6	117	10
Bloomfield[3]	20	2	194	3
Bristol	19	—	73	—
Burlington	10	1	41	2
Canton	9	1	49	1
East Granby	11	1	29	1
East Hartford	18	—	78	—
East Windsor	13	—	28	—
Enfield	11	—	47	—

[1]One colony with sacbrood.
[2]One apiary inspected twice.

Town	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
Hartford County—Continued				
Farmington	13	2	57	6
Glastonbury	23	1	84	1
Granby	16	—	69	—
Hartford	1	—	21	—
Hartland	2	—	9	—
Manchester	11	2	43	6
Marlborough	2	—	26	—
New Britain[2,1]	33	3	184	5
Newington	13	3	63	5
Plainville	13	1	47	1
Rocky Hill	6	—	34	—
Simsbury	13	1	34	1
Southington[2]	23	6	126	25
South Windsor	13	—	55	—
Suffield[3]	14	—	50	—
West Hartford	20	3	93	8
Wethersfield	16	—	58	—
Windsor[2]	21	4	102	9
Windsor Locks	4	—	38	—
	398	37	1,882	84
Tolland County				
Ellington	11	1	57	1
Hebron	8	—	41	—
Mansfield	13	—	45	—
Somers	11	—	37	—
Stafford	12	—	18	—
Tolland	2	—	10	—
Vernon	10	1	43	1
Willington	16	—	42	—
	83	2	293	2
Windham County				
Ashford	10	—	48	—
Brooklyn	7	—	76	—
Chaplin	2	—	5	—
Eastford	1	—	1	—
Hampton	8	—	31	—
Killingly	9	—	40	—
Plainfield	1	—	10	—
Putnam	7	1	32	1
Thompson	13	—	73	—
Woodstock	14	—	43	—
	72	1	359	1

[1]One colony with sacbrood.
[2]Two apiaries inspected twice.
[3]One apiary inspected twice.

SUMMARY

County	Number Towns	Apiaries Inspected	Apiaries Diseased (Am. f. b.)	Colonies Inspected	Colonies Diseased (Am. f. b.)
Fairfield,[1,3]	21	171	11	1,224	25
New Haven	21	92	8	1,047	25
Middlesex	15	127	2	1,028	6
New London	20	141	8	1,619	31
Litchfield[1,2]	25	249	15	1,403	35
Hartford[1,3]	29	398	37	1,882	84
Tolland	8	83	2	293	2
Windham	10	72	1	359	1
	149	1,333	84	8,855	209

	No. apiaries	No. colonies
Inspected, 1935	1,333	8,855
Infested with American foulbrood	84	209
Percentage infested	.063	.0236
Colonies treated		98
Colonies destroyed		111
Infested with European foulbrood	0	0
Average number of colonies per apiary		6.64
Cost of inspection for 1935	$2,075.23	
Average cost	1.556	.23

Financial Statement

RECEIPTS

Appropriation year ending June 30, 1935	$2,000.00

DISBURSEMENTS

Salaries	$ 887.04
Travel expense (outlying investigations)	1,070.32
Miscellaneous supplies	32.00
Total	$1,989.36
Balance on hand July 1, 1935	10.64*
	$2,000.00

RECEIPTS

Appropriation year ending June 30, 1936	$1,999.00

DISBURSEMENTS

Salaries	$607.20	
Travel expense (outlying investigations)	634.77	
Miscellaneous supplies	8.73	
Total		1,250.70
Balance on hand January 1, 1936		$ 748.30

[1]Fairfield County, two apiaries inspected twice; Litchfield County, one apiary inspected twice; Hartford County, six apiaries inspected twice.
[2]One colony with sacbrood.
[3]Three colonies with sacbrood.
*Reverts to State Treasury.

Registration of Bees

Section 2129 of the General Statutes provides that each beekeeper shall register his bees on or before October 1 of each year with the town clerk of the town in which the bees are kept, and that each town clerk, on or before December 1, shall report to the State Entomologist whether or not any bees have been registered, and if so, shall send a list of the names and number of colonies of each. In 1935, 1,333 apiaries containing 8,855 colonies were inspected. There were registered 629 apiaries and 4,028 colonies in 1935, and after checking the registrations and inspections, and deducting the duplications, the following figures show that at least this number of apiaries and colonies were kept in Connecticut in 1935:

	Apiaries	Colonies
Inspected	1,333	8,855
Registered but not inspected	251	1,212
Total	1,584	10,067

REPORT ON CONTROL OF THE GYPSY MOTH, 1935

W. E. Britton, J. T. Ashworth and O. B. Cooke

The operations for the control of the gypsy moth in Connecticut during the scouting season of 1934-1935 were conducted by the regular state gypsy moth organization, with the able assistance and coöperation rendered by the United States Bureau of Entomology and Plant Quarantine, under the general direction of A. F. Burgess. Crews of scouts from various CCC camps throughout the State have been kindly furnished by S. S. Crossman, under whose direction the gypsy moth work in these camps has been conducted.

Through an arrangement with A. F. Hawes, State Forester, who has general supervision of the CCC camps, details of men were obtained from three of these camps in eastern Connecticut. With this help considerable valuable work was accomplished, which, otherwise, would have been impossible, as the regular state gypsy moth force was similarly engaged in other sections.

The writers here express their gratitude to the heads of these agencies and to the men under them for their satisfactory coöperation.

New Equipment

Four of the Ford, Model A, light delivery trucks, one purchased in 1930, the other three in 1929, reached the stage where it was advisable to exchange them rather than to make further repairs. They were replaced on June 8, 1935, by four 1935 Chevrolet canopy trucks with express bodies. During the course of the year, 1,500 feet of spray hose was purchased to replace a like amount that had become worn out through fair wear and tear. A rebuilt Royal typewriter was purchased to replace

the old model Remington typewriter that had become unusable. Two second-hand oil burning stoves were bought to replace the Sterling hot air heater and the Coleman gasoline heater, both of which were worn out and had to be discarded. Sundry wrenches and other repair tools that had become broken or worn out were replaced.

Control Operations

There follows a brief report of the gypsy moth control operations during the year by all three of the agencies.

SUPPRESSION WORK BY STATE CREWS

The regular state scouts operated in the four counties of Hartford, New London, Tolland and Windham.

Hartford County. It was expected that the federal men would cover Hartford County but because of a reduction in their working force they were unable to accomplish as much as had been planned. By agreement, the state men carried on control work in Bloomfield, East Hartford, South Windsor, West Hartford and Windsor, all towns that were known to be infested. In Bloomfield a fairly large infestation was discovered on oak trees on the lawn at Saint Thomas Seminary in the south central portion of the town near the West Hartford town line. All other infestations in these towns were smaller. Less work was done in Hartford County than for several years because of the greater need of attention to large infestations known to be present in the eastern portion of the State.

New London County. In the towns of Colchester, East Lyme, Franklin, Griswold, Groton, Ledyard, Lisbon, New London, North Stonington, Norwich, Preston, Salem, Sprague, Stonington and Waterford, scouting was carried on either for egg-clusters or larvae. Infestations were found in all of these towns except Waterford, which was examined during the larval season. Because of the large infestation at Groton Long Point, discovered in the summer of 1933, considerable attention was devoted to the town of Groton in 1935. Although the scouting work revealed a general infestation throughout the town, it is a satisfaction to report that at the Groton Long Point infestation there was found only 14,573 new egg-clusters and 43,124 old ones as against 284,664 altogether, in 1934. However, the results of scouting show that the gypsy moth certainly is still prevalent in New London County, particularly in most of the towns bordering Long Island Sound.

Tolland County. Scouting operations were conducted in the towns of Andover, Bolton, Columbia, Coventry, Ellington, Mansfield and Stafford. Either egg-clusters or larvae were found in each of these towns. The town of Ellington, in which much scouting was done, was found to be generally infested in its eastern half. The southwestern portion of Coventry was covered with infestations, none of which had reached an alarming size.

Windham County. When scouting for larvae in 1934, several large and important infestations were discovered in the towns of Windham County. With this in mind, scouting crews were set at work to reduce these large colonies as well as to ascertain the degree of infestation in the towns. Killingly was found to be generally infested. Several large

colonies were discovered in Woodstock and several small ones in Hampton. In Putnam, one large infestation and two small ones were discovered in the central portion of the town. Three colonies were discovered in the northwestern portion of Plainfield, during the short period that a scouting crew was available for work in that town. Old infestations in Brooklyn and Windham were examined and larvae found at all points visited. Observations indicate that the gypsy moth is still very prevalent in Windham County.

Altogether, state men worked in 35 towns in Windham, Tolland, New London and Hartford counties, discovered 252 infestations, creosoted 143,317 egg-clusters, sprayed 47 infestations with 9,335 pounds of lead arsenate, killed 56,911 caterpillars and pupae, and scouted 971 miles of roadside and 2,780 acres of woodland.

WORK PERFORMED BY CCC MEN

During the past year much valuable work was done in examining large woodland areas in various portions of the State by details of men from several of the CCC camps. These crews were supervised by trained gypsy moth foremen selected from both the state and federal forces. For the most part they were set at work in and around areas where gypsy moth infestations had previously been discovered. The block method of scouting was employed and they were able to inspect a large proportion of all trees and brush growth within each area, and greatly to reduce the number of egg-clusters that would otherwise hatch the following spring. These men worked in 38 towns in Windham, Tolland, Middlesex, Hartford, New Haven and Litchfield counties, around more than 86 separate infestations, creosoted 191,499 egg-clusters, killed 664,888 caterpillars and pupae, and scouted 1,015 miles of roadside and 267,274 acres of woodland.

WORK DONE BY FEDERAL MEN

Federal men worked in Litchfield and New Haven counties. They had planned to cover more territory but it became necessary to reduce the force. However, federal men scouted the towns of Orange, Wallingford, and Woodbridge in New Haven County, and Canaan, Cornwall, Goshen, Kent, Litchfield, Norfolk, North Canaan, Salisbury, Sharon and Warren in Litchfield County. No gypsy moths were found in Orange and Woodbridge but an infestation was discovered in Wallingford. All towns examined in Litchfield County were found infested except Goshen and Sharon. The more important infestations were sprayed, and as most of them were in hilly woodland, some were almost inaccessible. Altogether, the federal men discovered 31 infestations, creosoted 11,119 egg-clusters, sprayed 11 infestations with 58,114 pounds of lead arsenate, and scouted 63 miles of roadside and 26,902 acres of woodland.

No work was done in Fairfield County.

Quarantines

The only change in the state gypsy moth quarantine in Connecticut during the year became effective March 15, 1935, and transferred the three towns of Montville, Salem and Waterford from the lightly infested

to the generally infested area in order to make the state quarantine coincide with Federal Quarantine No. 45, areas shown in Figure 15, Bulletin 368. Federal Quarantine No. 45 was revised, effective November 4, 1935, permitting that "certain articles classed as restricted herein may, because of the nature of their growth or production or their manufactured or processed condition, be exempted by administrative instructions issued by the Chief of the Bureau of Entomology and Plant Quarantine when, in his judgment, such articles are considered innocuous as carriers of infestation." Also it requires "that persons to whom certificates are issued shall report, at the time of shipment, all consignments to points outside the regulated area."

The following pages show the statistics of the work done by all three agencies, with summary on page 290.

STATISTICS OF INFESTATIONS, 1934-1935*

Towns	Infestations found	Egg-clusters creosoted	Number colonies sprayed	Poison used (lbs.)	Larvae and pupae killed	Miles of roadside scouted	Acres of woodland scouted
Windham County							
Ashford[1]	10	1,046	0	0	0	0	801
Brooklyn[2]	0	0	0	0	1,767	0	0
Eastford[1]	5	6,600	0	0	0	0	268
Hampton	4	278	0	0	0	3	32
Killingly	100	11,370	22	286	0	66	6
Plainfield	3	421	0	0	605	1	0
Pomfret[1]	3	60,217	0	0	0	0	644
Putnam	3	3,669	0	0	0	4	4
Windham	0	0	0	0	204	0	0
Woodstock	3	14,165	0	0	0	5	90
Total	131	97,766	22	286	2,576	79	1,845
New London County							
Colchester[3]	1	98	0	0	0	0	0
East Lyme	1	193	1	745	0	3	172
Franklin	2	61	0	0	0	29	3
Griswold[2]	0	0	0	0	508	0	0
Groton	37	59,684	3	2,385	1,862	130	360
Ledyard	1	21	0	0	0	14	0
Lisbon	1	1	0	0	0	48	0
New London	5	279	1	285	8,512	3	0
North Stonington	13	18,085	0	0	0	0	408
Norwich	3	1,236	3	180	5,615	0	6
Preston[2]	0	0	0	0	1,212	0	0
Salem	1	29	1	390	0	56	11
Sprague	1	1	0	0	0	40	0
Stonington	7	5,929	1	975	0	25	0
Waterford[2]	0	0	0	0	0	0	0
Total	73	85,617	10	4,960	17,709	348	960
Tolland County							
Andover	3	6,782	0	0	5,942	20	208
Bolton	4	435	2	342	537	0	58
Columbia[2]	0	0	0	0	20,367	0	0
Coventry	11	964	4	954	0	14	102
Ellington	37	14,904	0	0	348	91	1,312

*All number references on page 290.

Towns	Infestations found	Egg-clusters creosoted	Number colonies sprayed	Poison used (lbs.)	Larvae and pupae killed	Miles of roadside scouted	Acres of woodland scouted
Tolland County—Continued							
Mansfield[2]	0	0	0	0	79	0	0
Stafford[4]	5	13,798	0	0	9,331	0	90
Union[1]	58	17,520	0	0	0	0	8,657
Willington[1]	5	542	0	0	1,350	0	768
Total	123	54,945	6	1,296	37,954	125	11,195
Middlesex County							
Chester[1]	0	0	0	0	0	1	2,306
Cromwell[1]	0	0	0	0	0	4	682
East Hampton[1]	0	0	0	0	0	2	735
Haddam[1]	0	58	0	0	832	10	5,463
Killingworth[1]	0	0	0	0	0	0	320
Middlefield[1]		278	0	0	1,865	34	6,835
Middletown[1]		2,135	0	0	26,765	78	19,814
Total		2,471	0	0	29,462	129	36,155
Hartford County							
Berlin[1]	P	176	0	0	1,902	76	12,396
Bloomfield	4	4,374	4	914	0	73	0
Burlington[1]	P	1,777	0	0	18,000	42	11,293
Canton[1]	P	3,913	0	0	5,093	1	334
East Granby[1]	P	125	0	0	0	38	11,605
East Hartford	1	8	1	72	3	0	8
Farmington[1]	P	951	0	0	35,541	2	674
Granby[1]	P	70,919	0	0	357,317	89	28,477
Hartford	0	0	0	0	0	161	0
Hartland[1]	P	2,076	0	0	22,424	44	18,251
New Britain[1]	P	133	0	0	972	50	8,499
Newington[1]	P	2	0	0	439	14	3,671
Rocky Hill[1]	0	0	0	0	0	3	853
Southington[1]	P	78	0	0	1,399	25	5,506
South Windsor	2	38	1	90	0	77	0
West Hartford[4]	4	428	3	1,717	3,088	109	67
Wethersfield[1]	P	164	0	0	3,163	4	1,915
Windsor[2]	0	0	0	0	19	0	0
Total	11	85,162	9	2,793	449,360	808	103,549
New Haven County							
Branford[1]	P	106	0	0	5,287	73	22,963
Guilford[1]	P	125	0	0	69	39	8,570
Madison[1]	0	0	0	0	0	15	2,025
Meriden[5]	P	623	0	0	12,410	110	11,683
North Branford[1]	0	0	0	0	0	1	940
Orange[5]	0	0	0	0	0	0	4,545
Wallingford[5]	1	238	0	0	0	9	935
Wolcott[1]	P	1,207	0	0	18,122	22	4,732
Woodbridge[5]	0	0	0	0	0	6	1,509
Total	1	2,299	0	0	35,888	275	57,902
Litchfield County							
Barkhamsted[1]	P	6,536	0	0	134,103	72	21,553
Canaan[5]	14	3,938	3	23,732	0	18	7,365
Colebrook[1]	P	26	0	0	1,029	64	20,115
Cornwall[5]	2	263	1	2,940	0	3	1,192

Towns	Infestations found	Egg-clusters creosoted	Number colonies sprayed	Poison used (lbs.)	Larvae and pupae killed	Miles of roadside scouted	Acres of woodland scouted
Litchfield County—Continued							
Goshen[5]	0	0	0	0	0	1	0
Harwinton[1]	P	34	0	0	1,080	5	2,120
Kent[5]	1	12	0	0	0	0	218
Litchfield[5]	1	478	1	4,440	0	2	1,005
New Hartford[1]	P	198	0	0	12,630	94	21,313
Norfolk[5]	5	554	1	3,210	0	4	3,603
North Canaan[5]	1	13	0	0	0	6	1,299
Plymouth[1]	0	0	0	0	0	1	171
Salisbury[5]	2	457	1	2,815	0	1	2,402
Sharon[5]	0	0	0	0	0	1	9
Warren[5]	4	5,166	4	20,977	0	12	2,820
Winchester[1]	0	0	0	0	8	1	165
Total	30	17,675	11	58,114	148,850	285	85,350

Summary of Statistics

County	Towns covered	Infestations found	Egg-clusters creosoted	Number colonies sprayed	Poison used (lbs.)	Larvae and pupae killed	Miles of roadside scouted	Acres of woodland scouted
Windham	10	131	97,766	22	286	2,576	79	1,845
New London	15	73	85,617	10	4,960	17,709	348	960
Tolland	9	123	54,945	6	1,296	37,954	125	11,195
Middlesex	7	P	2,471	0	0	29,462	129	36,155
Hartford	18	11	85,162	9	2,793	449,360	808	103,549
New Haven	9	1	2,299	0	0	35,888	275	57,902
Litchfield	16	30	17,675	11	58,114	148,850	285	85,350
Grand Total	84	369	345,935	58	67,449	721,799	2,049	296,956

Financial Statement

July 1, 1935—June 30, 1935.

RECEIPTS

Appropriation year ending June 30, 1935	$39,430.00

DISBURSEMENTS

Salaries	$13,440.63
Labor	19,542.76
Stationery and office supplies	40.58
Insecticides	39.03
Small hardware	12.24
Automobile oil	135.63
Telephone	50.55

[1]Work done by men from CCC camps.
[2]Scouted for larvae only.
[3]Scouted around old infestations.
[4]Work done by CCC men and state men.
[5]All work done by federal men.

Financial Statement—Continued

Travel expense (outlying investigations)	216.15
Travel expense (gasoline for automobiles)	786.40
Freight and express	8.35
Fuel	62.90
Electricity	24.88
Automobiles (new)	2,109.80
Automobiles (repairs)	295.85
Tools, machinery and appliances (new)	1,801.81
Tools, machinery and appliances (repairs)	42.84
Rent of building (storehouse)	450.50
Insurance (automobile)	264.65
Medical services and supplies	31.30
Chemicals	17.55
Miscellaneous contingent expenses	54.61
Total Disbursements	*$39,429.01*
Balance on hand July 1, 1935	.99**
	$39,430.00

*In addition to this amount, $119.70 was paid out of Insect Pest Appropriation.
**Reverts to State Treasury.

PRESENT STATUS OF MOSQUITO CONTROL WORK IN CONNECTICUT

R. C. Botsford

The regular duties of the Station in relation to mosquito control were carried on during the year in a manner similar to that of 1934. This work consists of examining areas or possible mosquito breeding places where mosquito nuisances have been reported or requests made for an examination. This may be done at any season, although it is more satisfactory between the months of April and September when specimens of larvae, pupae or adult mosquitoes may be taken for identification. Then more definite recommendations can be made to eliminate the source of the nuisance. Mosquitoes may also be sent to the Station for identification.

Figure 93. View of broad outlet ditch showing how the sods are stacked to prevent floating. Milford.

Under Section 2415 of the General Statutes, the Director of the Connecticut Agricultural Experiment Station is authorized to order mosquito work done whenever funds are provided for that purpose; and under Section 2416, the Director is authorized to maintain properly ditched or otherwise treated areas subject to his acceptance.

An increasing number of complaints of mosquito nuisances and requests for mosquito investigations are received from year to year from residents of inland towns. These come especially from sponsors of the Y.W.C.A., Y.M.C.A., Girl Scout and Boy Scout camps, and also from

privately organized groups. The increase does not necessarily mean that mosquitoes are increasing in abundance, but more likely that individuals are beginning to realize that these nuisances are unnecessary and are taking advantage of the services of this state department.

Maintenance work was carried on in the salt marsh areas of Stamford, Norwalk, Westport, Fairfield, West Haven, New Haven, Hamden, East Haven, Branford, Guilford, Madison, Clinton, Westbrook, Old Saybrook, Old Lyme, Groton and Stonington. All salt marsh areas in the above-mentioned towns were covered by the regular crews as rapidly as possible; and in some cases relief labor was pressed into service to prevent the emergence of mosquitoes in certain areas which could not be covered in time by the regular crews. Every ditch must be patrolled in order to prevent stoppage that might cause flooding or a deposit of stagnant water anywhere on the marsh area. Pipe outlets and culverts, tide gates and dikes were inspected at intervals throughout the season to insure proper functioning, and in many cases emergency repairs were made before serious damage was done.

Although funds provided by the Legislature are insufficient effectively to control mosquito breeding in the accepted salt marsh areas, the ditches, which represent a large initial expenditure of private or town funds, are still in fair condition. The dikes, tide gates, and pipe outlets which are important factors of the control work are in a bad state of repair. Provision has been made, however, for much of this old construction work to be redesigned and rebuilt under the proposed WPA programs.

Since November, 1933, the Station has been sponsor for state-wide mosquito control projects under the CWA and the FERA. This work will no doubt be continued under the WPA. A building at 1337 Dixwell Avenue, providing offices, drafting room, storeroom, small shop and large yard space, was secured for this work. An entomologist was employed to make a preliminary survey of the mosquito breeding places in the towns where applications had been made for a mosquito project. He collected larvae or pupae from the most accessible breeding places in each town visited, and reared the adults for future identification. A total of 93 towns were inspected and about 500 mosquitoes collected.

Up to this writing mosquito control work has been carried on with the use of relief labor in the inland towns of Ansonia, Derby, Shelton, New Canaan, Hamden, North Haven, Southington, East Hartford, Manchester and Essex, and in all the shore towns excepting Bridgeport, Groton and Stonington.

Altogether about 9,000 acres of salt marsh have been newly ditched and several hundred acres reditched. This completes the ditching of all salt marsh areas in the State except in Stratford, areas in Lyme and Essex, and scattered areas adjacent to salt marshes known as fresh water extensions. These fresh water extensions, which occur at a slightly higher level than the salt marshes, are flooded only by extremely high tides. High spring tides tend to leave brackish pools in such areas for the breeding of the early salt marsh mosquito, *Aëdes cantator*. It is important, therefore, that all fresh water extensions be ditched.

New tide gates have been constructed and are operating in New Haven, Greenwich, Stratford, Milford, Branford, Guilford, Clinton and Old

Saybrook. At Shell Beach, Guilford, a new masonry sea wall, 300 feet long, was completed.

Mosquito control work in salt marsh areas now under way with relief funds includes surveying, ditching of salt marsh areas and fresh water extensions, building masonry sea walls and sod dikes, installing tide gates with masonry abutments and in masonry manholes, building timber jetties to protect outlets of marshes, and laying of pipe outlets. Work in fresh water areas consists of ditching fresh water swamps in populated places, filling sections impractical to drain, lowering improperly graded highway culverts and field drains which cause swampy places, constructing both open and closed stone drains, grading and straightening natural streams and waterways, including stoning of sides to prevent erosion of banks, and other operations too numerous to list here.

FIGURE 94. View of a portion of the extensive Stratford salt marsh, looking across the ditches and showing the piles of sods.

The number employed on the mosquito project averaged 587 skilled and unskilled laborers, 20 field supervisors, 6 engineers and draftsmen, 2 safety supervisors, 1 administrative supervisor, 1 secretary, 2 typists and 1 clerk. J. Peter Johnson was placed in general charge of the personnel; the engineering and construction work was directed by George L. Burke.

All the above work was engineered and constructed with the idea of permanency and satisfaction to all concerned; also much of it improved sanitary conditions and will relieve flood conditions. These improvements should, therefore, be considered as an important investment, and provision be made in each town for their maintenance.

The following is a resumé of mosquito control work accomplished with the use of federal funds under the CWA and FERA:

Ansonia

Upper Colony Street: Cleaned culverts at Upper Colony St. and North Main St., ditched meadow, cleaned and corrected brook through meadow and down to Upper Main St. Completed.

Westfield Avenue: Cleaning culvert under Wakely Ave., lowering culverts at Westfield Ave. and Jackson St., cleaning and straightening stream, stoning up curves, ditching swamps, installing four catch basins and gratings. Not completed.

Hotchkiss Pond: Installed vertical drain in kettle hole, with stone drains to pick up water. Completed.

Hull Street: Drained pond by ditching to drain; cleaned bottom. Completed.

Cook's Pond: Lowered water behind dam, cleaned out pond; graded and cleared banks. Completed.

Nelson Estate Drain: Replacing present stone drain with 18-inch pipe, with necessary manholes, intake, etc. Not completed.

FIGURE 95. View at Shell Beach, Guilford, showing new sea wall and manhole containing tide gate, built by relief labor.

Branford

Sybil Creek: Repaired old tide gates; installed 18-inch cast iron pipe with stone inlet and outlet chambers; built tide gate and grates; dug outlet channel; cleaned salt marsh. Completed.

Branford River: Building tide gates; removing old tide gates; filling in old channel; diking highway; ditching salt marsh. Not completed.

Harbor Street: Removed old tide gate and built new tide gate; cleaned out stream and ditched salt marsh. Completed.

Stony Creek: Closing hole in present stone dike; building new sod dike; building tide gate abutment; installing new tide gate. Not completed.

Bullard Swamp: Survey only.

Clinton

Hammonasset River: Ditching salt marsh; cleaning and straightening outlet. Not completed.
Grove Beach: Ditching salt marsh; cleaning and straightening outlet; installing tide gate on Hammock River. Not completed.
Grove Beach: Section north of U. S. Highway No. 1, ditching salt marsh, cleaning and straightening main channel. Not completed.

Darien

Salt Marsh: Various locations where salt marsh ditching was done. Not completed.

Derby

Derby Meadows: This work consists of cleaning out three 48-inch culverts; lowering one 48-inch culvert under a trolley embankment; cleaning, deepening and straightening main channel; draining a pond, ditching a swamp; also installing a tide gate on a 48-inch pipe. Not completed.
Coon Hollow: Cleaned out outlet and ditch; dug ditch and ditched swamp; cleaned culvert under Hawthorne Ave. Completed.
Pickett's Pond Brook: Filled low spot, cleaned brook; lowered pond and cleaned edges. Completed.
Island Park Pond: Cleaned out 48-inch culvert, ran short length of 24-inch sewer pipe; filled pond; installed 12-inch pipe outlet with tide gate; poured concrete plug. Completed.
Cedric Avenue: Cleaned outlet and ditched swamp. Completed.

East Hartford

Bottom Land: Building outlets and ditching, installing culverts, etc. Not completed

East Haven

Morris Creek: Description of work will be found under "New Haven". Not completed.
Farm River: Survey only.
Bradford Cove: Survey only.
Caroline Creek: Survey only.
East Haven River (East Branch): Survey only.

East Lyme

Mamacock River: Ditched salt marsh and cleaned out main stream. Completed.
Niles Creek: Ditched salt marsh and cleaned outlet. Completed.
Rocky Neck Park: Ditching salt marsh, digging main channel for outlet; installation of jetty to protect outlet. Not completed.
Crescent Beach: Survey only.

Essex

Ivoryton Store Meadow: Ditched swamp. Completed.
Wright's Meadow: Ditched swamp. Completed.
Fall's River Mill Pond: Ditched swamp and cleaned banks. Completed.
Sunset Lake: Ditched. Completed.
Centerbrook Meadow: Ditched salt marsh. Completed.
Valley Farm: Cleaned and straightened brook. Completed.
Great Meadows: Ditching salt marsh. Not completed.
Mud Brook: Cleaning brook. Not completed.

Fairfield

Salt Marsh: Various locations of salt marsh reditched. Completed.

Honey Pot Creek Marsh: Replacement of 36-inch pipe under the Old Post Road with a 48-inch pipe; lowering culvert under New Post Road; lowering a 48-inch culvert under Meadow Brook Road; cleaning, straightening and deepening main channel; ditching salt and fresh water marsh; installing tide gate on 48-inch pipe. Not completed.

McKinley School Swamp System: Fresh water work. Completed.
Ash Creek Pond: Draining pond—fresh water work. Not completed.
Fairfield Beach: Installed cast iron lock joint pipe. Completed.
Penfield Road: Survey only.
Berkley Road: Survey only.

FIGURE 96. Laborers excavating a deep main ditch from East Hartford meadows to Connecticut River.

Greenwich

Todd's Point: Ditched salt marsh, repaired manholes; installed tide gate. Completed.
Hillside Road Drain: Ditched swamps, replaced 160 feet of 6-inch vitrified pipe with 12-inch pipe; lowered grade; lowered 24-inch vitrified culvert. Completed.
West End Avenue: Ditched salt marsh; improved outlet. Completed.
Mead's Point: Ditched salt marsh; improved outlet. Completed.
Greenway: Ditched salt marsh; improved outlet. Completed.
Ledge Road: Ditched salt marsh; improved outlet; cleaned culverts. Completed.
Loughlin Avenue: Ditched salt marsh; improved outlet. Completed.
Benjamin Street: Ditched salt marsh; improved outlet. Completed.
Lake Side: Lowered 200 feet of 12-inch vitrified pipe; ditched salt marsh. Completed.
Ten Acres: Ditched old ice pond. Completed.
Greenwich Gardens: Relaid pipe; ditched swamp. Completed.
Arcadia Street: Ditched swamp. Completed.

Greenwich Academy Athletic Field: Regraded pipes and ditched swamp. Completed.
Lockwood Road Swamp: Ditched swamp; cleaned culverts, etc. Completed.
"Electrolux Swamp": Ditched swamp; cleaned culverts, etc. Completed.
Strickland Brook: Cleaned stream; ditched swamp; laid up walls. Completed.
Maple Swamp: Cleaned and straightened brook. Completed.
Sheep Hill Road: Ditching swamp. Not completed.

Groton

Poquonock River: Deepened channel of river near the Post Road; cleaned out culvert; ditched small patch of salt marsh. Completed.

Palmer's Meadow: Replaced stone culvert under road with pipe culvert; lowered culvert; ditched meadow; cleaned out and rebuilt old stone drain; blasted small ledge. Completed.

Groton Kettles: Installed 18-inch pipe with two manholes; inlet grating; walled ditch, ditched two ponds. Completed.

Bluff Point: Installed two culverts. Completed.

Guilford

Fresh Water: This work consisted of cleaning out and correcting two brooks with their tributaries and ditching the fresh water swamp through which they passed; also, lowering several culverts. Completed.

Great Harbor: Removing old tide gate; building new tide gate; deepening outlet; building jetty; ditching salt marsh. Not completed.

Shell Beach: Rebuilt old stone dike; installed tide gate in manhole; laid additional pipe; ditched salt marsh. Completed.

Indian Cove Marsh: Building stone faced concrete dike; installing tide gates and abutments; replacing seven culverts and ditching marsh. Not completed.

Hamden

Winchester Property: Survey only.

Madison

Hotchkiss Marsh: Survey only.
Rindge Property: Survey only.
Canoe Harbor: Survey only.
Waterbury Avenue: Survey only.
West of Madison Yacht Club: Survey only.

Manchester

Bigelow Brook: Cleaned and straightened channel from the Hockanum River to source; removed old dam; cleaned ponds; cleaned culverts; ditched swamps. Completed.

Hop and Porter Brooks: Cleaned and straightened channel; cut down crest of Roger's Dam; cleaned Roger's Pond; drained and cleaned Gould's Pond; drained and ditched "Rickety Pond"; ditched swamps. Completed.

Plymouth Lane: Ditched swampy area. Completed.

Hockanum River: Cleaned stream, ditched adjacent swamps. Completed.

White Brook: Cleaned stream and culvert. Completed.

Lydall Brook: Cleaned stream and ditched swamps. Completed.

Boggy Stowe: Constructing outlet to Union Pond; lowering culvert; ditching swamp. Not completed.

East Cemetery Brook: Cleaned stream and culverts. Completed.

Globe Hollow Brook: Cleaned brook, culvert, etc. Completed.

Milford

Beaver Brook: Straightening out channel and ditching salt marsh. Not completed.

Silver Beach: Ditched salt marsh; replaced tide gates; built two tide gate manholes; installed three culverts; replaced one culvert. Completed.

Harbor: Ditched salt marsh. Completed.

Indian River: Ditched salt marsh; cleaned outlet; cleaned culverts. Completed.

Calf Pen: Ditched salt marsh; cleaned outlet. Completed.

Merwin Beach: Cleaned culvert; closed one end of culvert; built manhole; installed vitrified pipe; ditched salt marsh. Completed.

Oyster River: Ditching salt marsh; cleaning outlet; correction of stream; cleaning culverts. Not completed.

Point Beach: Cleaning outlet; installing tide gate in manhole; removal of old culvert and installation of new concrete pipe including manhole; cleaning out stream and ditching area. Not completed.

Interdale: Installed collecting sump; ditched swamp; installed pipe and dug ditch; drained salt marsh. Completed.

Housatonic Meadow: Ditched salt marsh. Completed.

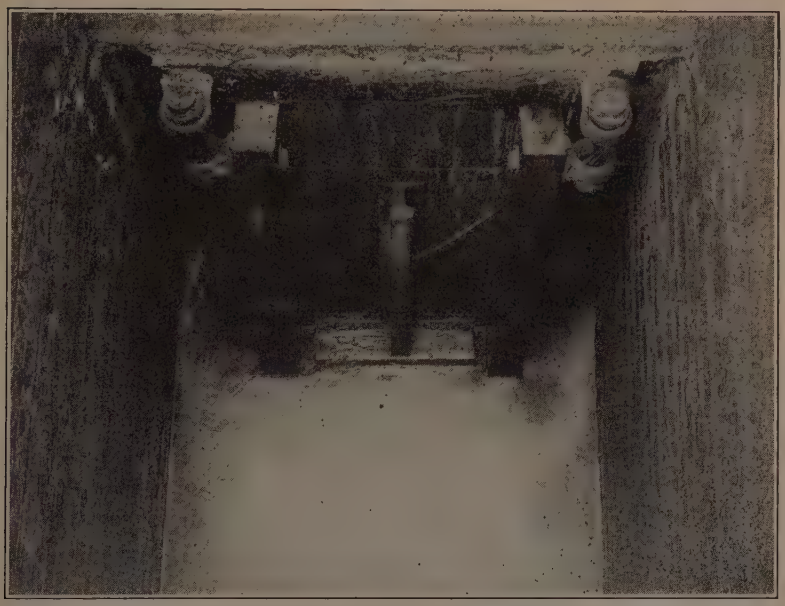

FIGURE 97. This picture was taken looking downward into manhole to show the tide gate and specially designed hinges. Milford.

New Canaan

Five Mile River: Suspended.

Noroton River: Suspended.

New Haven

Morris Creek: Dredging Morris Creek from mouth to Thompson Ave. by drag line dredge; cleaning out stream from Thompson Ave. to source, including so-called "Tuttle Brook"; ditching salt marsh; building tide gate; rebuilding two bridges; dropping three culverts; blasting one ledge at mouth. Not completed.

Fort Hale Park: Installed outlet, manhole and tide gate. Completed.

New London

Thames Ship Yard: Ditched salt marsh. Completed.
Ocean Beach: Ditched salt marsh. Completed.
Coleman Street: Ditched swamp; cleaned and lowered culverts. Completed.
Fort Trumbull: Ditched salt marsh; cleaned culvert. Completed.

North Haven

Quinnipiac River: Ditching salt marsh; lowering culverts. Not completed.
Little River: Fresh water work. Cleaning brook; ditching swamp; cleaning culvert. Not completed.

Norwalk

Salt Marsh: Ditched various salt marsh areas. Completed.
George Street Drain: Constructed stone drain; ditched swamps; installed six pipe culverts; constructed catch basin. Completed.
Wilson Point: Cleaning ditches; repairing or replacing tide gate; eliminating weirs, etc. Not completed.

Old Saybrook

Oyster River: Ditching salt marsh; cleaning outlet, installing tide gate. Not completed.
Hammock River: Ditched salt marsh; cleaned outlet. Completed.
Connecticut River: Ditched salt marsh; cleaned outlet. Completed.
Plumb Bank: Ditched salt marsh; cleaned outlet. Completed.
Gee's Pond: Suspended.
Knollwood: Ditched salt marsh and cleaned outlet. Completed.
Fenwick: Ditched salt marsh; cleaned outlet. Completed.

Shelton

Burying Ground Brook: Cleaning and straightening brook; stoning up sides; removing old dam; draining pond. Not completed.

Southington

Eden Avenue: Cleaned and straightened stream; installed culvert; reconstructed culvert; cleaned culverts; drained Kelly Pond. Completed.
Quinnipiac River: Removing dam; digging new channel; straightening stream; stoning curves; ditching swamps. Not completed.

Stamford

Southfield Point: Lowering sill on inlet chamber; cleaning outlet ditch; replacing grating. Not completed.
Southfield Avenue: Recut ditches. Completed.
McGee Avenue: Recut ditches. Completed.
Lindstrom Road: Recut ditches. Completed.
Sound View Avenue: Recut ditches. Completed.

Stratford

Great Meadows: Ditching salt marsh; closing break in sod dike; repairing dike; digging outlet channel; installing outlet pipes and tide gates. Not completed.
Common Meadows: Ditched salt marsh; improved outlet; cleaned culverts and two pipes; repaired tide gates. Completed.
Ahearn Meadows: Ditched salt marsh; improved outlet. Completed.
Long Brook Meadows: Ditched salt marsh; improved outlet; cleaned culverts; installed tide gate abutment and tide gate. Completed.
Housatonic Meadow: Ditched salt marsh; improved outlet. Completed.
Lighthouse Meadows: Ditched salt marsh; improved outlet. Completed.
River Edge Meadows: Ditched salt marsh; improved outlet. Completed.
Surf Avenue: Survey only.
Sniffen's Meadow: Survey only.
F. C. Beach Marsh: Survey only.

Waterford

Ridgewood Park: Ditched salt marsh; improved outlet. Completed.
Hammond Park: Ditched salt marsh; improved outlet. Completed.
Pleasure Beach: Ditched salt marsh; improved outlet. Completed.
Millstone Brook: Ditched salt marsh; improved outlet; cleaned culvert. Completed.
Niantic River: Ditching salt marsh; improving outlet; cleaning culverts. Not completed.
Jordan Brook: Ditched fresh water marsh; improved outlet. Completed.
Thames View: Ditched salt marsh; improved outlet, cleaned culvert. Completed.

Westbrook

Rushy Meadow: Installed new outlet pipe. Completed.
Fisk Beach: Installed new outlet pipe. Completed.

West Hartford

Farmington Avenue and Mountain Road: Survey and study for drainage. (Work to be done by Town.)

West Haven

Oyster River: Salt marsh ditching; cleaning outlet; correction of stream; cleaning culverts. Not completed.
Cove River: Ditching salt marsh; cleaning culvert; improving outlet. Not completed.

Westport

State Park Marsh: Recut ditches. Completed.
Dead Man's Brook: Cleaning stream and ditching. Not completed.
Minute Man's Statue: Survey only.

EUROPEAN CORN BORER CONTROL, 1935

W. E. Britton, M. P. Zappe and N. Turner

In the Station Report for 1934, page 199, was given a brief account of the clean-up campaign that was conducted in the fall of 1934 at an approximate cost of $3,510.48. As a result, in part, of this campaign, much fall plowing was done that year.

Two bills were introduced into the General Assembly of 1935, one repealing the European corn borer law and the other amending it to remove the quarantine provision and fixing a later date for the disposal of cornstalks, weeds and debris. As action on these bills was not taken at once, the old law and clean-up date, April 10, remained in force. The Agricultural Committee did not favor repeal, but amended the law advancing the date to April 25. Consequently, enforcement inspectors were not sent into the field until after that time.

On many farms the land was too wet to work, and it was thought best to give the growers more time in which to effect the clean-up. On April 29, six inspectors were sent into those sections where the European corn borer caused severe damage in 1934 and which were covered in the fall clean-up campaign. These men were on duty until May 31 and found many fields in which the cornstalks, stubble and large weeds had not been disposed of in a proper manner. The inspectors were instructed to place the names of all violators in the hands of the prosecuting officers for legal action. In some towns the prosecuting attorney wrote a letter to each offender, allowing several more days to clean up before starting

legal action. In most cases, however, warrants for arrest were issued and served. Altogether 57 arrests were made, and each individual was required to clean up his premises properly before the case was closed. Some cases were nolled on payment of costs. Others were fined and assessed costs. Frequently the fines were remitted on payment of costs. In one town both fines and costs were suspended with the understanding that if these men should be arrested again and found guilty on the same charge, both old fines and costs would be collected, together with any new fines and costs that may be imposed by the court.

Altogether 68 towns were covered by the 6 inspectors between April 29 and May 31. The men traveled about in their own motor cars for which they were paid on a mileage basis. The cost of the spring clean-up was $1,361.65.

New Legislation

The European corn borer law, Chapter 171, Public Acts of 1929, as amended by Chapter 111, Public Acts of 1935, is now Section 2125 of the General Statutes and reads as follows:

Sec. 2125. European corn borer. The director of the Connecticut Agricultural Experiment Station shall issue and publish orders, rules and regulations, which shall be effective in any town or portion thereof, which orders, rules and regulations may require that each owner, tenant or manager of land on which corn of any kind has been grown shall, not later than December thirty-first of the year of its growth, plow or cause to be plowed the field in which it was grown, so as to bury the stubble, corn plants or portions thereof to a depth of at least six inches, or pull up and destroy such stubble or cause it to be pulled up and destroyed by burning, and each person having in his possession corn stalks, or plants or parts of plants or products of plants which are or may be infested with the European corn borer, shall, not later than April twenty-fifth of the year following that of their growth, completely dispose of such corn stalks, or plants or parts of plants or products of plants which are or may be infested with the European corn borer, by using them as fodder or by burning them, and shall destroy or cause to be destroyed, on or before April twenty-fifth of each year, all weeds in such areas as may be designated by the director of the Connecticut Agricultural Experiment Station. Any person who shall violate any provision of this section or any order, rule or regulation issued by authority of any such provision shall be fined not more than twenty-five dollars. Effective May 21, 1935.

Quarantine Revoked

Quarantine order No. 36 concerning the European corn borer

Whereas Federal Quarantine No. 43 was revoked July 15, 1932, and State Quarantine Order No. 31, as revised to cover the entire State, effective February 10, 1932, has been retained because of the provision of Section 2125 of the General Statutes, making compulsory clean-up measures enforceable only in areas under quarantine; and whereas a revision of Section 2125, effective May 21, 1935, removes the quarantine stipulation, so that there is no further need for the quarantine.

Now, therefore, I, William L. Slate, Director of the Connecticut Agricultural Experiment Station, under authority conferred by Section 2124, General Statutes, do hereby proclaim the provisions of Quarantine Order No. 31, and all prior quarantines concerning the European corn borer, to be revoked.

This order shall become effective June 1, 1935.

Insecticide Investigations

During the year, insecticides for the control of the European corn borer were tested in coöperation with the Federal Bureau of Entomology and

Plant Quarantine, Cereal and Forage Insect Division. Results of the work will be published separately at an early date.

Date of Planting Experiment

Corn was planted at 10-day intervals from April 23 to July 10 to determine the relation between date of planting and corn borer injury. Four varieties were used: (1) Spancross C2, an extra early yellow hybrid, (2) Resistant Market, an extra early yellow inbred, (3) Whipcross P39, a mid-season yellow hybrid, and (4) Redgreen, a late white hybrid. As the ears were harvested, they were examined for corn borer injury.

Since this test covers only one season, no conclusions can be drawn. The results of the test may be summarized as follows: (1) Both the date of planting and the date of maturity affect the corn borer infestation; (2) regardless of date of planting, all corn maturing between July 16 and August 1 was heavily infested with first generation larvae; (3) mid-season and late corn planted when the first generation moths were in flight was moderately damaged; (4) all corn maturing after August 23 was infested with second generation larvae; and (5) late corn at no time showed as much damage to ears as early corn.

Federal Survey

Mr. A. M. Vance of the Bureau of Entomology and Plant Quarantine was in charge of a European corn borer survey made between August 16 and September 15, 1935, in all of the states infested by both the single generation and the two-generation corn borer. The results were included as a supplement to No. 9, Vol. 15, of the Insect Pest Survey Bulletin. In Connecticut the results of this survey showed an increase in corn borer population in Hartford, New Haven and Middlesex counties, over preceding years, but a decrease in New London County.

Observations on Corn Ear Worm

Investigations were limited to field observations on life history and abundance of the ear worm at Mount Carmel. The first larva was found in corn picked on July 23 and until August 12 larvae were common. Between August 12 and September 3 not a single larva was seen in any of the corn harvested. From September 3 to October 1, ear worms were again plentiful. This indicates that there were two well-defined generations in 1935.

The infestation in corn at the Mount Carmel farm was as follows:

	Total ears	Infested	Per cent infested
First generation (July 23—Aug. 12).....	893	29	3.2
Second generation (Sept. 3—Oct. 1).....	1,575	491	31.1

Corn maturing late in September was infested by ear worms and larvae of the European corn borer. Of the total, 47.8 per cent had corn borers, 23.5 per cent ear worms, and 37.5 per cent was clean.

JAPANESE BEETLE WORK IN CONNECTICUT, 1935

Also p. 251

J. PETER JOHNSON

Scouting

Scouting for the Japanese beetle began on July 15 and ended September 7. There were four crews, each consisting of one foreman and three scouts, stationed at Bridgeport, Hartford, New Haven and Storrs. All were on Federal funds, three of them working under the supervision of the Boston office, and the other under the New Haven office. Four Chevrolet half-ton trucks were furnished by the U. S. Department of Agriculture for transportation. As in past seasons, each crew followed an itinerary and scouted classified establishments on an average of three times, as well as other concerns desiring classification. Altogether there were 96, many of which were subdivided, so that more than 96 areas were scouted within the State. The minimum distance examined around each firm was 500 feet and altogether 189 beetles were found. Besides these places, the men covered the premises of 87 dealers in sand, soil and manure, and of 5 farm lands, from one to three times each.

SUMMARY OF BEETLES FOUND

Location	Dates found	Number of beetles
Branford	July 17—Aug. 6-9-12	71
East Hartford	July 26—Aug. 28	3
Greenwich	July 26	2
Hamden	Aug. 2-9	5
Montowese (North Haven)	July 27—Aug. 10	23
Norwalk	July 20—Aug. 8	6
New Canaan	July 23-30	21
New London	July 29-30—Aug. 10-12-22	22
Ridgefield	July 30—Aug. 16	29
Shelton	Aug. 3	4
Waterford	Aug. 23	1
Yalesville	July 19	2
Total beetles found		189

The scout crew working out of Hartford received a report that there was an infestation of Japanese beetles on the Windsor-Windsor Locks town line. Upon investigation, several beetles were found and at a later date the trapman scouted the same area and found a great many more. This was the first time beetles were reported from these two towns.

Trapping

Japanese beetle traps baited with liquid bait composed of geraniol and eugenol were placed in the field, beginning July 1, to learn whether or not these beetles were present. Twenty-five traps were placed in Canaan, 25 in Cheshire, 25 in Norfolk, 61 in New Milford, 25 in Thompsonville, 50 in Torrington and 75 in Winsted.

All the traps were set up by July 19 and remained set until September 9. The only town in which beetles were trapped was Torrington, where four were taken.

Inspection and Certification

Again this season, the district inspectors were able to take care of the farm products quarantine inspection work in addition to their regular routine duties. As may be seen by the table below, this work amounted to only a small portion of that carried on in Connecticut.

Inspection points were located as follows:

Location	No. of Inspectors
New Haven	2
Manchester	1
Middletown	1
Willimantic	1
Westerly, R. I.	1
Total	6

Kind and amount of products certified:

Products	Amounts
Corn	6 bags
Beans	1½ bus.
Apples	352 bus.
Peaches	½ bu.
Cut flowers	28 boxes

The total number of plants inspected and certified for shipment to other states and foreign countries was 1,525,255, while 28 carloads of sand and 25 carloads of manure were shipped to other states.

The number of certificates issued is shown below:

TABLE 3. CERTIFICATES ISSUED

Kind	Farm products	Cut flowers	Nursery and Ornamental Stock	Sand Soil	Manure	Total
'A'	3	0	39,993	428	0	40,424
'B'	13	0	7,721	161	52	7,947
Stamp	12	29	990	1	0	1,032
Total	28	29	48,704	590	52	49,403

There were 10,282 more certificates issued, and 41,117 more plants inspected and certified for shipment to other states and foreign countries during 1935 than in the year preceding.

During the summer of 1935, Japanese beetles were found in greatly increased numbers in the old centers of infestation: Bridgeport, New Haven, Stamford and Hartford. There were also small increases in many other communities. The first beetle was seen on June 29 and the last, October 12, showing that they were present earlier and remained longer than in 1934.

TESTS OF APPLE SPRAYS, 1935

M. P. ZAPPE AND E. M. STODDARD

Spray tests have been carried on at the Experiment Station orchard, Mount Carmel, as a coöperative project between the departments of Entomology and Botany. It has been demonstrated that a regular

spray schedule of lead arsenate, hydrated lime and fish oil will give satisfactory control of insects and diseases on nearly all varieties of apples. The exceptions are kinds that are subject to apple scab, such as McIntosh and Fall Pippin. On these, the lead-lime-fish oil combination failed to control apple scab but may be used successfully after the calyx spray, provided that apple scab has been controlled by earlier sulfur sprays.

In 1935 one of the two largest plots was sprayed with lead arsenate, 3 pounds; hydrated lime, 10 pounds; fish oil, 1 quart; and water, 100 gallons. The other plot had the same treatment except that raw linseed oil was substituted for the fish oil. There were no McIntosh trees in either of these plots and only four trees of Fall Pippin in the linseed oil plot.

The other smaller plots all contained McIntosh trees and one also had Fall Pippin. These were sprayed with dry lime-sulfur, 6 pounds; flotation sulfur, 5 pounds; magnetic sulfur, 5 pounds. In addition, 3 pounds of lead arsenate per 100 gallons of water were added to each tankful of spray. Treatment began on the smaller plots with the prepink spray on May 2, followed by pink, calyx, 7-day cover spray, 30-day cover spray, and final spray on July 16.

The fish oil and linseed oil plots were sprayed the same number of times as the others with the omission of the prepink application. This was left out of the schedule because these plots were not particularly subject to apple scab, and for that reason their treatments began on May 8.

Pests were present in the orchard in about average numbers, with the exception of the plum curculio. Previously this orchard has been particularly affected by the curculio because there are many wild or neglected trees near it, and a peach orchard adjoining it on the south, where these insects may breed in large numbers. However, severe winters of the past two years destroyed the peach blossoms. There was no crop and consequently fewer curculios. In 1935, unsprayed trees showed less curculio injury than in any year since the orchard came into bearing.

Results at Harvest Time

This experimental orchard produced a fair crop of fruit considerably larger than in 1934. The season was about normal in the spring, followed by a rather dry summer and a very dry fall until just before picking time. Then there were heavy rains. The fruits were highly colored, especially the Baldwins, which were a very deep red with little green showing. The fall was rather warm and apples did not keep well. McIntosh rotted rather quickly in common storage. Apples with slight stem punctures, which under ordinary conditions keep fairly well, began to decay in a very short time. All varieties seemed to ripen too quickly in common storage.

Table 4. Results of Sulfur Spray Tests on Small Plots

	Magnetic sulfur McIntosh	Flotation sulfur McIntosh	Dry lime-sulfur McIntosh	Unsprayed McIntosh	Flotation sulfur Fall Pippin	Unsprayed Fall Pippin
Good	97.48	95.94	94.82	7.33	90.97	12.79
Curculio	1.34	1.66	3.14	31.76	6.39	46.08
Codling moth	.02	.04	.007	1.37	.05	.36
Other chewing insects	1.04	.78	1.27	60.00	.96	21.94
Sooty blotch	0	.03	.07	14.19	.17	12.07
Scab	.21	1.57	.74	60.92	1.51	69.65

There seems to be little choice between the three sulfur combinations, as shown in Table 4. Magnetic sulfur appears to be just a little better than flotation sulfur, which in turn is slightly better than dry lime-sulfur. As there is only a difference of about 3 per cent between the poorest and best treatments, factors other than the spray materials may be responsible. The trees in the dry lime-sulfur plot were considerably larger than those in the other two plots and possibly were not sprayed quite so thoroughly. There were no Fall Pippin trees in either the magnetic or lime-sulfur plots, so no comparison can be made of this variety. Fall Pippin trees were present in the flotation sulfur plot and good control of all pests was obtained. Fruit in all of the sprayed plots was above 90 per cent good. (Where the term "good" is used, it means that this fruit was perfect, showing no injuries of any kind, however slight.) Most of the injured fruit was good enough to be placed in a commercial No. 1 grade.

TABLE 5. RESULTS OF SPRAY TESTS ON BALDWIN AND GREENING

	Lead-lime-fish oil		Lead-lime-linseed oil		Unsprayed	
	Baldwin	Greening	Baldwin	Greening	Baldwin	Greening
Good	79.92	83.73	80.86	89.44	1.84	3.05
Curculio	15.93	5.01	12.04	3.56	67.50	58.64
Codling moth	0	0	.01	.01	2.27	.22
Other chewing insects	1.56	1.93	2.42	1.24	28.17	36.03
Sooty blotch	2.94	9.46	4.91	5.53	66.86	79.66
Scab	.13	.34	.12	.47	1.84	2.18

TABLE 6. AVERAGE RESULTS OF SPRAY TESTS ON ALL VARIETIES

	Lead-lime-fish oil all varieties	Lead-lime-linseed oil all varieties	Unsprayed all varieties
Good	85.60	87.35	5.76
Curculio	7.94	5.82	56.93
Codling moth	.003	.007	1.00
Other chewing insects	1.72	1.75	34.73
Sooty blotch	4.84	4.08	68.9
Scab	.15	1.30	6.96

Baldwin and Greening were the only two varieties occurring in both the lead arsenate, lime and fish oil, and in the lead arsenate, lime and linseed oil, plots. Table 5 shows the results of the spray tests on these two varieties. There is little difference in the efficiency of these two treatments. Some of the fruit growers object to the odor of fish oil and in some cases have found it difficult to obtain, but raw linseed oil is common and can be purchased readily.

Table 6 shows results on all varieties present in these plots. On the fish oil plot were Greening, Baldwin and Roxbury Russett and on the linseed oil plot: Greening, Baldwin, King, Northern Spy, Sutton and Fall Pippin. Here again there was little choice between the two sprays used except that the Fall Pippin had some apple scab present (about 15.8 per cent), but averaging these in with the other varieties brought the

total percentage of apple scab down to 1.3 per cent. Omitting the Fall Pippin figures, the percentage of scab in this plot was about the same as in the fish oil plot.

Results of this year's tests indicate that under ordinary Connecticut conditions magnetic sulfur, flotation sulfur or dry lime-sulfur can be used on varieties that are subject to apple scab. Either lead arsenate, lime and fish oil, or lead arsenate, lime and linseed oil may be used on most apples, bearing in mind the fact that neither of these sprays is recommended for those susceptible to apple scab.

In connection with other tests in this orchard, an experiment in the control of cedar rust was conducted. In this work dry lime-sulfur and Bordeaux mixture, in combination with a sulfonated phenol and casein glue, were used as fungicides. The materials applied with the fungicides were used as spreaders and stickers and in this capacity gave excellent results. No injury was caused by the dry lime-sulfur, but the Bordeaux caused very severe burning and defoliation.

As often happens in experimental work, there was not a heavy infection of cedar rust present, even on unsprayed trees, and a count of the fruit showed very little difference between the sprayed and unsprayed trees, although there was definitely less infection on the foliage of the sprayed trees.

THE EUROPEAN SPRUCE SAWFLY IN CONNECTICUT

G. H. Plumb

The European spruce sawfly, *Diprion polytomum* Hartig, was first found in Connecticut in October, 1934. Several cocoons were collected from the litter beneath trees in the Macedonia State Park in Kent. These were suspected of being cocoons of *D. polytomum*, but adults failed to emerge from them. On September 9, 1935, however, partly grown larvae of this species were taken in the same place, thus verifying the belief that the insect was present in the State. Since then specimens have been taken in various stages of development in several other localities, namely: West Hartford, Orange, Middlebury, West Hartland, and in one area on the Litchfield-Morris town line.

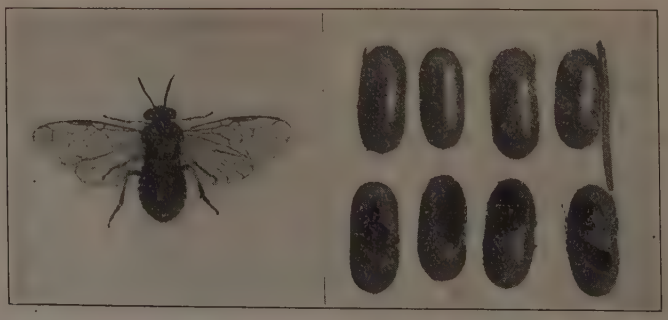

Figure 98. The European spruce sawfly. Left, female; right, cocoons; the contents of the lower row have been eaten by rodents. Twice natural size.

It is probable that the insect entered Connecticut from the North, as a heavy infestation is centered on the Gaspé Peninsula in Lower Canada, and the sawfly has been found in the intervening New England States and in New York State. It was first discovered in Canada in 1930, probably having been present since about 1924. Judging from the amount of defoliation on the trees at Kent, it may have been in Connecticut for four or five years. In Europe the species has been known for more than a century, having been described first in 1834, but it never has been a serious pest of spruce there. In Canada the injury done to native spruces has reached alarming proportions and may well become a major

FIGURE 99. Female European spruce sawfly laying eggs. Twice natural size. At left, needles containing eggs. Four times enlarged.

problem. Red, white and black, as well as Norway spruces, are attacked. In Connecticut the chief host is Norway spruce. Although in Connecticut there are no large contiguous areas of spruce, the defoliation noted to date indicates that the insect is capable of causing severe stripping where an infestation is allowed to build up.

The body of the adult is about 6 mm. in length and black in color with yellow markings on the head, thorax, abdomen and legs (Figure 98). The wings are unmarked save for a yellowish brown stigma on the front margin of the anterior pair. A complete description is given by Enslin (1917).

The eggs of the spruce sawfly are laid singly in slits cut in the needles by the adult females (Figure 99, adult ovipositing). Only occasionally is more than one egg found to a needle under laboratory conditions. Fully developed eggs, dissected from the ovarioles, averaged about 1.5 mm. in length. The egg is green in color, about the same shade as the

needle, and is reniform in shape. When first laid, there is no indication of the presence of an egg in a needle, other than a slight discoloration marking the slit. Within a few hours, however, the egg begins to swell, eventually forcing the walls of the slit apart. As growth progresses, this swelling continues and the egg protrudes partly from the slit (Figure 99). This facilitates egress of the larva on hatching.

In order to gain some idea of the biotic potential of this species, two females were fixed and dissected and a count made of the eggs. One female which was killed shortly after emergence yielded 38 mature eggs

FIGURE 100. Larvae of European spruce sawfly feeding on spruce twig. Natural size.

and 19 immature eggs in different stages of development. Another female was not killed until some 24 hours after emergence. This one contained 46 fully developed, and 19 immature eggs.

According to Balch, Simpson and Preble (1934), the females of this species reproduce parthenogenetically, males being found but rarely. The fact that the progeny of mated females are all males lends itself to the suggestion that males be imported from Europe, where they are more common. This might have the effect of reducing the total population of injurious forms. No males have been collected in Connecticut.

Eggs kept in the laboratory at a constant temperature of 76°F. and a relative humidity of 63 per cent, hatched in from five to six days. The newly hatched larvae are about 3 mm. in length, and are a pale green in color. The head, which is colorless at first, soon becomes a dark, fuscous brown, the characteristic markings scarcely visible. Shortly, however, the head coloration changes to a light tan ground color, overlaid with a light to dark brown pattern. The most prominent cephalic markings are red brown to dark brown and shaped like elongated horseshoes. One occurs on each side of the head. Each arises at the medio-posterior margin of the eye and runs dorsad toward the vertex; then it curves caudad and runs ventrad along the rear margin of the head, ending on a plane parallel to the center of the eye.

While the body length of the larva immediately after the first molt is still about the same size as that of the first instar, increase in size is very rapid thereafter. A fully grown larva may be from 19 to 22 mm. in length. In the third instar, faint whitish markings appear, and in the fourth instar, the characteristic white stripes are developed (Figure 100). There are five of these stripes, two on the mid-lateral line and two more halfway between these and the dorsum, which bears the fifth. Those on the mid-lateral plane are margined by a very thin black line. These white stripes persist from the fourth through the fifth instars, but are not present in the sixth.

The duration of the life cycle of sawflies reared in the laboratory at the temperature and relative humidity previously mentioned was as follows: Egg stage, 5-6 days; first instar, 3-6 days (average 4 days); second instar, 2-6 days (average 3 days); third instar, 3-6 days (average 4 days); fourth instar, 5-7 days (average 6 days); fifth instar, 5-9 days (average 7 days); period in cocoon, 10-12 days. Thus an entire generation was spanned in less than 6 weeks.

After the fifth molt, the larva ejects most of its intestine and spins its cocoon. The sixth larval instar is thus a quiescent period spent in the cocoon. In this region the cocoons are formed in the litter beneath the trees, usually not more than two inches below the surface and close to the mineral soil. The cocoon is brownish in color, about 9 mm. long and ovoid in shape (Figure 98). The insect may remain in the cocoon for months or even years before emerging. It is probable that there are two generations in Connecticut and a partial third may also be present. In the fall of 1935 larvae in all stages of development were taken at the same time, indicating an overlapping of generations.

The larvae feed only on the older needles (Figures 100 and 101). The young larvae usually eat only the outer portions of the needle, leaving the central tissues. The older larvae are quite voracious feeders. One in the fifth instar consumed as many as 18 fairly large needles over a 24-hour period. Although a few adults have been seen chewing the needles to a slight extent, it is questionable whether or not this was a feeding operation.

The natural controlling factors appear to operate extensively against this insect in Connecticut. The cocoons are formed in the forest debris and therefore many individuals are destroyed by rodents (Figure 98, bottom). On numerous occasions the adult of *Podisus maculiventris* Say, an hemipteron, has been seen sucking the body fluids of larvae.

The effect of climatic factors has not been determined. In a lightly infested stand of Norway spruce at Orange, Conn., the infestation appears heavier on trees about 15 feet high as compared to those 4 to 6 feet high.

In ornamental plantings this sawfly should be easily controlled by spraying with lead arsenate, but in the forest the establishment of parasites appears at present to be the most feasible means of keeping the insect in check. In Connecticut this work with parasites is being carried on by the United States Bureau of Entomology.

FIGURE 101. Spruce branches with twigs partially defoliated by larvae of European spruce sawfly.

It is hoped that *D. polytomum* will not become a serious pest of spruce in Connecticut, but sufficient evidence for prognosis has not yet been gathered. Since there are no very large forest plantings of spruce here, it may be that no extensive damage will occur. There is, however, a sufficiently large amount of spruce planted about the State to warrant further investigation and search for means of control should a heavy outbreak be threatened.

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NOTES ON A SCALE INSECT NEW TO CONNECTICUT

Matsucoccus matsumurae Kuwana

G. H. Plumb

On September 18, 1935, an unusual discoloration of the current season's growth was noticed on a small group of pitch pine trees in the town of Chaplin. Many of the twigs were partly denuded of needles and both the twigs and the remaining needles were brown and appeared dead. The needles seemed to have dropped off when the twig died. An examination of some of the twigs showed that the surface of the bark was sparsely to densely covered with tiny dots, giving it a speckled appearance. These were also present on last year's growth.

From a more careful microscopic examination it was found that these specks were the cast larval skins of a scale insect which proved to be *Matsucoccus matsumurae* Kuwana. Beneath each skin was a small hole leading to a cell of considerable size under the bark, which contained from one to three cast skins. According to Herbert[1], these are the skins of second-stage apodous larvae, while those on the outside are the cast skins of the first-stage larvae. The insect seems to hibernate in the second larval stage, the adults emerging in the early spring. The newly hatched larvae settle on the young growing twigs. The exact method of forming the cell is not known, but apparently the plant tissues grow about the larvae, thus embedding them.

This interesting scale is found in the eastern Atlantic States and on the west coast in this country, and in Japan it has been taken on *Pinus virginiana* and *Pinus thunbergii*, as well as on *Pinus rigida*. It is still debatable whether or not it is indigenous to this country or whether it has been introduced from Japan. The fact that the two other species of the genus are native to America might indicate that this one is also. However, it may be native to both countries.

When the same locality was again visited on November 27, 1935, the brown, dead appearance of the twigs was no longer noticeable, although the larval skins were still present.

The insect was also found in the towns of Willington and Windsor.

WHITE GRUB INJURY TO SEEDLING APPLE AND PEAR TREES

Philip Garman

During August, 1935, our attention was called to damage from white grubs, *Phyllophaga fusca* Froh., in a block of seedling apple and pear trees in a nursery in Ellington. The trees were growing on land previously in sod which had been turned under prior to planting.

An inspection of the plot was made and grubs were found to be numerous, mainly full grown, and both in and between the rows. Many of the grubs were at least four inches below the surface. Counts by Dr. M. V. Anthony indicated that from 2.5 to 3.75 per cent of the trees in

[1] Herbert, Frank B.:—"The genus Matsucoccus with a new species" (Hemip.-Homop.). Proc. Ent Soc. Wash., 23:15. 1921.

the block were injured and showed signs of the infestation above ground. At the time of the visit, August 9, some of the trees had already been removed and many were injured without showing the effects above ground. A rough estimate placed the damage at about 10 per cent of the trees in the plot.

In order to test the possibility of treatments for control, carbon disulfide emulsions prepared by Dr. Anthony were applied to some of the trees showing signs of grub feeding. A preparation containing 66-2/3 per cent carbon disulfide, diluted 1 to 50, 1 to 100 and 1 to 200, was applied, using varying amounts per tree. On August 12 the plot was again visited and the trees were dug and the grubs counted. At one pint per tree, dilution 1 to 100, or 1 per cent of the 66-2/3 per cent stock, 5 live grubs

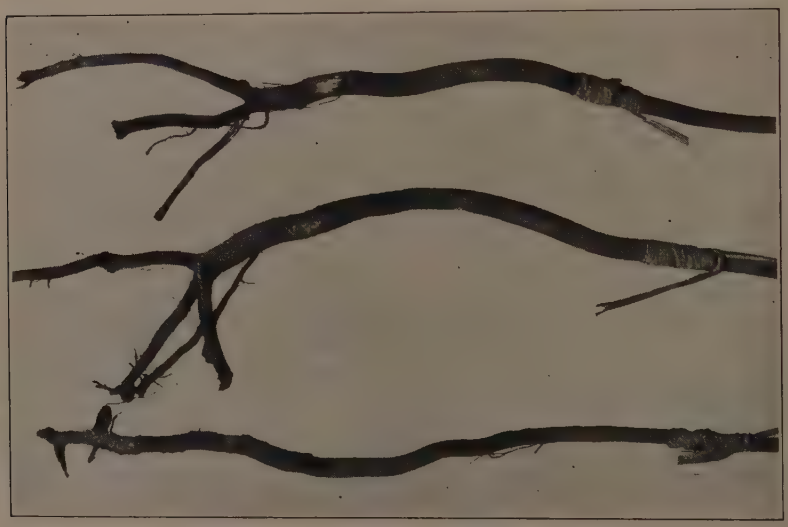

FIGURE 102. Budded apple stocks showing how roots were eaten by white grubs. Somewhat reduced.

were found and one doubtful; apparently the material had no effect. Using 2 quarts per tree, dilution 1 to 100 and 1 to 200, 75 per cent were killed with the 1 per cent stock, and 41 per cent with the .5 per cent stock. Used at a dilution of 1 pint to 50, and 1 pint per tree, only 50 per cent of the grubs were killed.

It was concluded that the treatments were not sufficiently effective to be practical, besides being expensive because of the large quantities of insecticide required. In view of the fact that the grubs were mature and nearly through feeding, it was thought best not to recommend insecticide treatments for their control. Probably no treatment at that time would have had much effect considering the condition of the grubs, although stimulation with fertilizers might help the trees outgrow the injury. Some of the affected trees are shown in Figure 102.

Memoranda on White Grub Infestation

Field examined Monday, August 9.

Of 1,195 apples counted, 7 had died and 21 wilted. (2.5 per cent)

Of 1,242 pears counted, 20 had died and 28 wilted. (3.75 per cent)

It is believed, however, that in spots a much greater percentage of the trees were affected.

Experiments

(a) Treated 1 row of apples with CS_2 preparation (66-2/3 per cent CS_2) diluted 1-200, using 1 pint per tree.

(b) Also part of row diluted 1-100 and 1-200 poured along the row at estimated rate of 2 qts. per sq. foot.

(c) Small number of trees treated with 1-50 dilution, 1 pint per tree.

(d) Pears treated 1-100, one pint per tree.

Results

(a)	1-100	1 pint per tree	5 grubs alive, 1? dead	(no effect)
(b)	1-100	2 qts. per sq. foot	5 alive, 15 dead	(75 per cent killed)
	1-200	2 " " " "	10 " 7 "	(41 per cent ")
(c)	1-50	1 pint per tree	4 " 4 "	(50 per cent ")

Dug in between rows and had no difficulty finding grubs in almost any location.

Recommendations and Suggestions

Leave affected trees in position so that feeding on them will continue and migration to healthy trees be reduced to a minimum.

As the trees are seedlings and will be removed above the bud next year, fertilization might be advantageous.

Provide other food for grubs between the rows to prevent feeding on the trees. Suggest oats or some quick growing crop between the rows.

STUDIES IN BREEDING AND CONTROL OF THE APPLE MAGGOT

PHILIP GARMAN

During 1934 and 1935 an attempt was made to breed the apple maggot for experimental use with encouraging results. Flies were brought to the laboratory as soon as they emerged in field cages, and stocks of larvae collected from infested apples were also brought in from time to time and kept until the flies emerged. The breeding room was held at 75 to 78° F. and 60 to 65 per cent relative humidity. Under such conditions mating and oviposition took place normally and the flies lived much longer than was expected—a maximum of 103 days and an average of 41 days for late summer and early fall generations. Towards the latter part of the spring, however, the life of the flies was much shorter and breeding work was unsatisfactory until new apples could be obtained.

Oviposition occurs in green apples rather than ripe or ripening fruits, and the larvae develop normally in the green apples. Food and water

are necessary for the adult flies. Honey or honey and yeast was used, the food being replenished at frequent intervals. In cages where records were kept of this activity, maximum oviposition was not reached until nearly 3 weeks after emergence (2½ to 4 weeks) although oviposition frequently began within 7 to 10 days.

Cages for insecticide tests were set up with 10 to 20 flies, (occasionally more), in each, and those used for repellent tests were supplied with a treated and an untreated apple hung side by side near the top of the cage. In these tests the water supply was removed and the apples sprinkled daily in an effort to simulate orchard conditions.

Repellents to Oviposition

It was soon observed that certain materials such as lime, sulfur, talc, and others, exerted considerable action on the adult female and reduced the number of egg punctures. A series of oils and other materials was tried without striking results. Nicotine sulfate, ethyl oenanthate and anabasine sulfate showed slight to strong repellent effect, while iso-amyl phthalate tended to increase oviposition. (See Table 8.) Other substances were neutral or doubtful in reaction. Pure oil of peppermint and spearmint rubbed on the fruit showed no action in prevention of oviposition.

A series of tests with lime and Casco waterproof glue was conducted and the repellent action obtained appeared to be as good as or better than in other tests. In consequence field tests were started and trees sprayed with this combination in late June and early July. A significant reduction in infested fruit was obtained, but in one test where a direct comparison was made, the reduction was not as great as with lead arsenate. From these results it would appear that lime in itself has considerable value in sprays used to control the apple maggot.

Toxicity Experiments

Experiments with lead arsenate, cryolite, derris and phenothiazine, indicate that the main action of lead arsenate is prevention of oviposition during the period when eggs are laid. Of these materials lead arsenate and cryolite appeared to best advantage in laboratory tests although derris showed considerable toxicity to the flies and phenothiazine had considerable repellent action towards oviposition.

Of the above materials cryolite, lead arsenate and derris were tried in field experiments (Table 11), and from counts of fruit cut open at harvest it appeared that lead arsenate and flotation sulfur gave the best control, with cryolite and flotation sulfur next. Derris was much inferior to either cryolite or lead arsenate in these tests but showed considerable improvement over unsprayed trees. However, further experiments with derris are necessary to establish its status as a maggot control.

TABLE 7. COMPARISON OF TALC, LIME AND SULFUR DUSTS FOR PREVENTING OVIPOSITION BY THE APPLE MAGGOT

Dates	Material	Amount used in duster	Amounts deposited on slides	No. punctures on treated apple	No. punctures on check	Treated, per cent of check
1935						
Jan. 7-8	Talc	1 gm.	.0021 gm.	3	77	4
Jan. 8-9	"	1 gm.	.0017 gm.	0	17	0
			Totals	3	94	3
Jan. 7-8	Lime	1 gm.	.0017 gm.	1	32	3
Jan. 8-9	"	1 gm.	.0014 gm.	4	63	6
			Totals	5	95	5
Jan. 8-9	Sulfur[1]	1 gm.	.0013 gm.	39	113	34
Jan. 9-10	"	1 gm.	.0018 gm.	2	41	5
Jan. 10-11	"	1 gm.	.0020 gm.	19	64	29
			Totals	60	218	27
Jan. 8-9	Check (no	——	———	34	35[2]	97
Jan. 8-9	treatment)	——	———	30	33	91
Jan. 9-10		——	———	35	45	77
			Totals	99	113	87

[1] "Soluble amorphous" sulfur—very fine grade.
[2] Two apples in each cage. Apples graded into those having larger and smaller number of egg punctures.

NOTES: Treatment consisted of dusting each fruit with 1 gram of the materials, in each case weighed in ½ gram lots, the apple being placed on a revolving table in a dusting box, dusted with ½ gram and then reversed without being touched by hand and dusted again with ½ gram. Samples of the dust falling on the turn table were measured by weighing 2 microscope slides on which the dust had fallen during the course of treatment. Amounts falling on each slide are recorded above. The apples were then transferred to an air conditioned room and placed in the oviposition cages, one untreated apple being hung alongside in each experiment. Dust covering was very light and inconspicuous in all tests. January, 1935.

TABLE 8. TESTS OF REPELLENTS TO PREVENT OVIPOSITION OF APPLE MAGGOT FLIES

Materials used	Egg punctures on treated	Egg punctures on check	Treated per cent of check	No. of tests
Iso-amyl phthalate	28	12	233	4
Ethyl phthalate	19	22	86	4
Butyl phthalate	62	67	92	4
Ethyl oenanthate	140	254	55	9
Pyrethrum soap (1%)	33	47	70	3
Nicotine sulfate (1-500)	18	115	15	4
Anabasine sulfate (1-500)	11	44	25	3
Penetrol plus pyrethrum extract (1% of each)	153	151	101	4
Oil peppermint	71	53	135	5
Oil spearmint	76	81	93	5
Check	11	18	61	4
Check	55	68	81	3

PROCEDURE: Two apples hung in each cage, one of them treated, the other untreated. Cages were well ventilated and in some of the tests a light current of air was run through the cage with an electric fan. In the case of the check cages the apples containing the smaller number of egg punctures were considered the same as treated apples in the repellent tests.

TABLE 9. EFFECT OF SEVERAL LIME SPRAYS USED TO PREVENT APPLE MAGGOT OVIPOSITION, 24 TO 48-HOUR TESTS

Dates	Formula	Egg punctures on treated apple	Egg punctures on check apple	Per cent reduction
Jan. 29-30	Lime 4 gm, Glue[1] ½ gm, Water 200 cc	0	7	
Jan. 29-30	" " "	0	11	
Jan. 30-31	" " "	0	48	
Jan. 31-Feb. 2	" " "	0	7	
Feb. 2-3	" " "	0	18	
Feb. 3-4	" " "	0	11	
	Totals	0	102	100
Jan. 21-23				
	Lime 4 gm, Bentonite 2 gm, Glue[1] 4 gm, Water 200 cc	0	50	
Jan. 23-24				
	Lime 4 gm, Bentonite 2 gm, Glue ½ gm, Water 200 cc	4	30	
Jan. 24-25				
	Lime 4 gm, Bentonite 4 gm, Glue 1 gm, Water 200 cc	0	19	
Jan. 26-27				
	Lime 4 gm, " " "	3	24	
	" " " " "	0	25	
	" " " " "	7	38	
	Totals	14	186	92.5
Jan. 20-21	Check, no treatment	16[2]	22	
Jan. 21-22	"	22	28	
Jan. 22-23	"	17	18	
	Totals	55	68	19.1

[1]Casco Waterproof glue.

[2]Graded into those having larger and smaller number of punctures.

TABLE 10. SUMMARY OF LABORATORY CONTROL EXPERIMENTS TO KILL ADULT FLIES OF THE APPLE MAGGOT

Materials and dilution	No. tests	No. of flies	No. egg punctures	Av. punctures per fly
1 Lead arsenate 2 gms. to 100 cc.	5	101	0	.0
2 Natural cryolite 2 gms. to 100 cc.	6	112	1	.008
3 Derris (ground root) 2 gms. to 100 cc. with skim milk powder	5	118	8	.06
4 Phenothiazine 2 gms. to 100 cc. with skim milk powder	2	45	6	.13
5 Checks—no spray	5	170	530	3.11

PROCEDURE: Materials were diluted as indicated and sprayed uniformly on green, immature apples which were then hung in the cages. Food was supplied but the only water provided was sprinkled daily on the apples. All tests were run for 20 days after which time they were discontinued and the apples examined with a binocular for egg punctures. Temperature 75 to 78° F. and about 60 per cent relative humidity. Flies introduced shortly after emergence.

TABLE 11. RESULTS OF FIELD EXPERIMENTS TO CONTROL THE APPLE MAGGOT. EXPERIMENT STATION FARM, MOUNT CARMEL

Materials	Per cent infested	Varieties
1 Lead arsenate-flotation sulfur	4.9	Hurlburt
2 Lead arsenate-lime	11.8	Greening
3 Cryolite-flotation sulfur	8.2	Mother, Stark
4 Cryolite-talc	11.1	Greening
5 Derris spray	28.1	Greening
6 Check — no maggot spray	71.9	Greening

PROCEDURE

1. Maggot sprays June 27, July 10, July 25. Lead arsenate 3 lbs., flotation sulfur 3 lbs., lime 4 lbs., water 100 gallons.

2. Sprays June 27, July 25. Lead arsenate 3 lbs., lime sulfur (dry) 6 lbs., catalytic sulfur 4 lbs. to 100 gallons. Spray applied July 25 contained lead arsenate 2 lbs. and lime 3 lbs. to 100 gallons water.

3. Sprays June 27, July 10, July 25. Cryolite (Kryocide) 4 lbs., flotation sulfur 4 lbs., blood albumen 6 oz. to 100 gallons water. Blood albumen omitted July 10 and July 25.

4. Sprays June 27, July 10, July 25. Cryolite (Kryocide) 4 lbs., talc 4 lbs., blood albumen 6 oz. to 100 gallons water. Blood albumen omitted July 10 and July 25.

5. Sprays June 27, July 10, July 25, August 14. Derris 4 lbs., skim milk powder 1 lb., bentonite 2 lbs., to 100 gallons water; applications June 27, July 10, July 25. August 14, Derris 4 lbs., skim milk powder 2 lbs., water 100 gallons. Derris used was ground root, 4% rotenone.

NOTE: Samples of both dropped and picked fruit were cut open to obtain the percentage infested.

Summary

Apple maggots were bred successfully in the laboratory during 1935 and the flies used for experiments in control.

Lime, talc and sulfur repel the fly and prevent oviposition, as shown by laboratory and field tests.

Cryolite showed considerable toxicity in laboratory and field experiments, but derris, while effective in laboratory tests, was not so successful in the orchard.

CONTINUED STUDY OF ARSENICAL BURN ON PEACH TREES

PHILIP GARMAN

In an effort to trace the specific cause of arsenical burn on peach trees, 13 different brands of arsenate of lead were obtained, analyzed by Dr. H. J. Fisher of the chemistry department and tested, first on beans under greenhouse conditions and then on peach trees in the orchard. It appears from the work done so far with these samples that the cause of spotting and leaf drop is closely correlated with the total water-soluble arsenic. Doctor Fisher also analyzed the different brands for arsenic trioxide[1] but the amount of burn is apparently more closely associated with the total water-soluble arsenic.

In the early part of the growing season a comparison of two commercial brands combined with lime, sulfur and zinc sulfate, and used on peach trees in one of the regular sprays, showed no important differences in amount of leaf drop. Analyses of these two showed them to be within .06 per cent of one another in water-soluble arsenic. Later tests on a smaller scale showed conspicuous differences in amount of leaf drop where dilutions of 4 pounds per 100 gallons of water were used without lime or zinc sulfate. In these (Table 13) and other spraying experiments (Table 12) it appeared possible to detect differences in the amount of leaf burn where (within the range of these experiments) the amount of water-soluble arsenic in one sample is at least four times that of another used for comparison.

All the samples analyzed by Doctor Fisher are well within the limit allowed by federal authorities for water-soluble arsenic in commercial preparations, but it is evident that even the small amounts present in some cases are enough to cause plenty of injury when used without protective agents. It is apparent also that arsenates containing spreaders or correctives are somewhat improved over those without, but even these are equalled or surpassed in freedom of burn by brands with very small amounts of soluble arsenic, namely those containing .05 per cent or less, as found in two of the samples.

[1]Probably a part of the total water-soluble arsenic.

TABLE 12. WATER-SOLUBLE ARSENIC CONTENT COMPARED WITH AMOUNT OF FOLIAGE INJURY IN FIELD EXPERIMENTS. AVERAGE OF THREE TESTS CONDUCTED FROM JUNE 23 TO AUGUST 1, 1935

Brand	Total Soluble Arsenic	Total Leaves	Number Dropped	Per cent Dropped	Number Injured	Per cent Injured
1 Key Dry	.02	156	12	7.6	39	24.9
2 Orchard Brand (Gen. Chem. Co.)	.05	147	8	5.4	32	21.7
3 Nurexform (Grasselli)	.12	179	24	13.4	48	26.8
4 Bowker	.13	155	27	17.4	62	39.9
5 Ansbacher	.13	144	37	25.6	77	53.4
6 Sherwin-Williams	.14	174	46	26.4	99	56.8
7 Niagara	.17	99	24	24.2	42	42.4
8 Chipman	.22	122	35	28.6	77	63.0
9 Grasselli	.23	127	58	45.6	80	62.9
10 Astringent (Gen. Chem. Co.)	.28	147	26	17.6	56	38.0
11 Dow	.34	144	46	31.9	87	60.4
12 Acme	.35	93	64	68.8	78	83.8
13 Mechling	.46	140	57	40.7	108	77.1

NOTES: **Injury** means dropped foliage plus leaves showing conspicuous lesions from action of the arsenic. All counts were made after one week had elapsed. The method measures only the rapidity of burn and does not represent the total damage which would take place over a longer period. A hand sprayer was used; dilution, 6 gm. to 100 cc. water.

Samples used for these tests should not be regarded necessarily as representing the average run produced by a commercial concern since variations will occur with different batches. The experiments were conducted with a view merely to obtaining data on the cause of arsenical burn and if possible to learn what differences prevailed in samples available.

TABLE 13. COMPARISON OF FOUR BRANDS OF LEAD ARSENATE SPRAYED ON PEACH FOLIAGE, 4 LBS. TO 100 GALS. TEN-DAY TESTS. MOUNT CARMEL, 1935

Dates	Brand	No.	Total no. leaves	Number spotted	Number spots	No. leaves dropped	Per cent injured
8/3–13	Key Dry	1	16	2	2	0	
		2	19	2	2	1	
		3	16	1	1	1	
		4	21	3	3	0	
		5	17	5	12	3	
			89	13	20	5	20.2
	Mechling	1	14	9	38	2	
		2	14	4	4	1	
		3	13	7	30	4	
		4	24	5	14	13	
		5	24	10	39	4	
			89	35	125	24	66.2

TABLE 12—CONTINUED

Dates	Brand	No.	Total no. leaves	Number spotted	Number spots	No. leaves dropped	Per cent injured
8/3–13	Orchard Brand	1	17	2	2	0	
		2	18	1	1	0	
		3	20	2	2	1	
		4	19	0	0	0	
		5	24	6	6	0	
			98	11	11	1	12.2
	Acme	1	16	4	8	0	
		2	19	11	26	4	
		3	23	9	14	1	
		4	17	8	14	2	
		5	20	7	11	0	
			95	39	73	7	48.4
8/13–23	Key Dry	1	14	1		0	
		2	20	5		3	
		3	17	5		0	
		4	33	22		2	
		5	17	6		8	
			101	39		13	51.4
	Mechling	1	17	14		3	
		2	17	5		12	
		3	16	15		1	
		4	24	6		13	
		5	22	7		15	
			96	47		44	94.7
8/13–23	Orchard Brand	1	15	3		1	
		2	14	0		0	
		3	13	2		1	
		4	21	6		2	
		5	16	7		3	
			79	18		7	31.6
	Acme	1	27	12		7	
		2	19	2		1	
		3	10	4		2	
		4	20	7		8	
		5	21	10		3	
			97	35		21	57.7

Small branches in different parts of the tree selected in pairs. Number 1, for example, sprayed with Key Dry was adjacent to Number 1 Mechling, and so on.

FURTHER NOTES ON SPRAY RESIDUES FOR 1935

PHILIP GARMAN

Owing to a deficiency in rainfall during August, apples collected in Connecticut for the Dairy and Food Commissioner, from orchards and other sources, showed more excesses in spray residues than in former

years. Analyses of 179 samples were made by C. E. Shepard of the chemistry department, and of the number mentioned 7, or 3.9 per cent, were above tolerance for arsenic, and 33, or 18.4 per cent were above tolerance for lead. Twenty-three per cent of the samples were taken from storage and of these 4.7 per cent were above tolerance for lead, none for arsenic. Inspection of Mr. Shepard's data, which include also the date and nature of the last application, showed that not less than two months must be allowed between the last spray of lead arsenate and harvest dates in seasons similar to 1935.

Broken down into varieties (Table 14), the figures for lead residues show that the greatest trouble occurred with Gravenstein, Wealthy, McIntosh and Delicious in the order mentioned.

TABLE 14. ANALYSIS OF MR. SHEPARD'S DATA FOR LEAD RESIDUES

Variety	Number of samples	Per cent above tolerance for lead
Gravenstein	21	42
Wealthy	13	23
McIntosh	57	19
Delicious	13	15
Baldwin	35	5

It is evident that early fall varieties have given more trouble than others and that special care must be taken to avoid excessive residues on them. The following possibilities for keeping within tolerance figures are given to help growers produce fruit free of residues in dry seasons.

Possibilities for Avoiding Excess Residue

For Duchess, Astrachan, Yellow Transparent or other varieties ripening on or before the middle of August: Dust after June 15; no arsenical application after July 1.

For Gravenstein: Dust after July 1; no arsenical application after July 15.

For McIntosh, Wealthy and Delicious: No lead arsenate spray after July 15. Recommend 90-10 lead arsenate-sulfur, or 90-10-10 lead arsenate-sulfur-lime dusts, for late July or August applications.

Possibility of using improved calcium arsenates during July. These have not been tested by the Connecticut Agricultural Experiment Station.

No oil or other stickers after July 15 on any variety. Avoid wettable sulfurs containing stickers.

Thin so as to avoid small apples as much as possible.

Allow two months between last lead arsenate spray and harvest, and six weeks between the last dust and harvest.

Avoid applying excessive amounts of spray. Spray uniformly, moderately in July.

Removal of Residue

Apples not having more than .04 grains of lead per pound of fruit may be dipped in dilute hydrochloric acid, utilizing any kind of a wooden container, and the residue will be removed to tolerance. The amount of acid required for 100 gallons is 4-1/5 gallons of 32 per cent. This gives a 1.5 per cent acid bath (by weight). Immerse the apples for one to two minutes.

Apples with more than .04 grains of lead per pound will not be cleaned sufficiently in cold solutions.

NOTE: Sulfur dusting may interfere with European red mite control. Use sprays on Baldwins or other late varieties subject to attack.

CONTINUED TESTS WITH SUBSTITUTES FOR LEAD ARSENATE

PHILIP GARMAN

Additional experiments with lead arsenate substitutes at the Mount Carmel farm gave the following results. Natural cryolite combined with flotation sulfur gave fairly good control of curculio and other insects. When combined with copper silicate and talc, control was relatively poor and approximately 35 per cent of the fruit showed serious russet at harvest. Ground derris root in combination with bentonite and skim milk powder gave poorer results than either cryolite or lead arsenate in spite of an additional application in August. Control of curculio was particularly poor with this combination. Leafhoppers, although present in other parts of the orchard, were absent from the derris-sprayed plot. Derris also gave some reduction in codling moth and red-banded leaf roller injury, but was not equal to lead arsenate in control of these insects.

Samples from some of the trees sprayed with lead arsenate proved to be above tolerance because of the unusually heavy spray applications and the dry weather in August, but samples of heavily sprayed apples from the cryolite-flotation sulfur trees were reported to be below the tolerance limit for fluorine. No foliage burn was noted in the cryolite-sulfur plot and the trees in the derris-sprayed plot were in particularly good condition at the end of the season. The following table shows results of the count made at harvest and includes hand examination of about 400 bushels of apples. Results of the maggot count which were made separately will be found under the discussion of that insect. Data included there should be considered as a part of the lead arsenate substitute project.

TABLE 15.

Treatment	Per cent without external insect injury	Per cent Marked by			Per cent conspicuous spray russet
		Curculio	Codling moth	Red-banded leaf roller	
Lead arsenate plus flotation sulfur	91.5	.4	0.0	.1	
Natural cryolite plus flotation sulfur	65.4	9.7	.8	2.1	
Cryolite plus Coposil[1]	48.3	18.8	2.0	4.3	35.8
Derris spray	32.0	22.4	.9	1.5	
Check (pink spray only)	24.4	23.8	3.9	2.6	1.3

All trees received a pink spray of lead arsenate and flotation sulfur.

[1]Fruit russet very severe. Talc substituted for Coposil in July sprays.

REPORT ON PARASITE WORK FOR 1935

PHILIP GARMAN

The production of parasites for the control of the Oriental fruit moth was continued in 1935, the funds being partly supplied by the Connecticut Pomological Society through its committee organized for coöperation with the Station.

More than 11,000,000 egg parasites were reared at New Haven, but owing to trouble in grain moth production and an increased number of subscribers over last year, shipments were delayed in some cases. Grain moth eggs planted in peach orchards in May and early June by Messrs. Schread and Smith showed the presence of Trichogramma in nearly every orchard. All specimens reared were reported by Mr. Schread to be *T. pretiosa*. Stocks supplied to growers later in the season came partly from this source.

Laboratory production of the larval parasites *Bassus diversus* and *Dioctes molestae* was attempted for the first time and 5,199 Bassus and 1,200 Dioctes were reared for liberation. Production of *Perisierola angulata* was also continued, 7,850 being placed in orchards throughout the State. *Macrocentrus ancylivorus* was also bred, and 6,462 were liberated. Breeding of all parasites was handled by J. C. Schread, W. T. Brigham and G. R. Smith. Orchards selected for liberations this year were those showing considerable twig injury from the first two generations.

Because of the small number of fruit moth larvae in the field, extensive collections for parasite recoveries were not attempted. Macrocentrus was recovered, however, from a number of orchards, but there is some indication that parasitism by this species is decreasing, probably because of fruit moth scarcity.

Statistics of parasites liberated in Connecticut since 1930 are given below.

Parasite	Number liberated
Trichogramma pretiosa and *minutum*[1]	86,497,000
Macrocentrus ancylivorus	67,354
Perisierola angulata	11,283
Bassus diversus	6,042
Dioctes molestae	2,320
Ascogaster quadridentatus	1,886
Other species	914
Total larval parasites placed in orchards	89,799
Total foreign parasites[2]	21,445

Liberations of Fruit Moth Parasites by Years

	Trichogramma		Macrocentrus
1930	6,540,000	1930	11,600
1931	11,337,000	1931	10,736
1932	18,000,000	1932	9,500
1933	28,300,000	1933	4,656
1934	11,000,000	1934	24,400
1935	11,320,000	1935	6,462
	86,497,000		67,354

[1]Includes approximately 4 million delivered to Massachusetts growers. In addition, 100,000 *T. euroctidis* were liberated in 1933.

[2]Includes liberations by the U. S. Bureau of Entomology. The total received from this source was 3,467.

Liberation of Fruit Moth Parasites by Years (Continued)

Ascogaster		Perisierola	
1933	991	1934	3,433
1934	895	1935	7,850
	1,886		11,283
Bassus		Dioctes	
1934	843	1933	1,120
1935	5,199	1935	1,200
	6,042		2,320

Others	
1933	399
1934	515
	914

CLUSTERS OF FLIES MISTAKEN FOR RUST PATCHES

W. E. Britton

Some three or four years ago a new cement concrete highway bridge was constructed over the Housatonic River at Cornwall Bridge, Conn. In 1935 brownish spots appeared on this bridge. Engineer inspectors who thought them rust spots, reported that the construction job had not been properly supervised or inspected. Otherwise rust spots from the steel re-inforcing material would not show on the outside of the bridge. The Highway Commissioner sent someone to make a more careful examination, and the spots were found to be more or less covered with two-winged flies. Some were alive and others were dead. The brownish deposit was wholly on the surface of the concrete and could be scraped off.

This material was brought to the Station, June 6, and the flies were all of the same species, identified by Dr. R. B. Friend of this department as *Atherix variegata* Walker, of the Family Leptidae or Rhagionidae. The brown deposit was formed of egg-masses, which, although cream-colored when first laid, turn to reddish brown or fawn color later. Thus the areas where they were deposited were mistaken for rust spots. The accumulation of dead flies and debris, together with the weathering of the egg-masses, finally gave a distinctly gray appearance to the deposits. The largest discolored spot was reported to be on the crown of the arch under the bridge floor, about 50 feet above the water, and to cover an area of about 50 square feet. There were smaller spots nearer the water. One about a foot square, some 15 feet above the water, was on the under side of a cross beam.

On June 13 Doctor Friend visited the bridge. All eggs had apparently hatched and no living flies were seen. It was evident that all of the flies and egg-mass deposit had been removed from the concrete bridge, but the sides of the lower timbers of the old wooden, covered bridge close by, had heavy deposits of egg-masses and dead flies at least half an inch in thickness, as shown in Figure 103.

From the specimens brought to the Station, eggs deposited in the laboratory hatched in six days. The larvae dropped into the water and wriggled about in it. They are said to be predaceous. The only specimen of this species up to this time in the Station collection was collected at Northford, May 24, 1918, by M. P. Zappe.

An examination of the literature shows that the flies of *Atherix variegata* cluster in large numbers and lay their eggs on objects over water or near it. On hatching, the young larvae drop or find their way into the water. Probably the larvae live in running water, because there are several

FIGURE 103. View of underside of covered bridge at Cornwall Bridge. The dark patches on the large timbers are egg-masses and dead flies of *Atherix variegata*.

records of this species occurring at altitudes of 6,000 and 7,000 feet in Colorado, Utah and Wyoming. There are also many records at lower elevations in the New England States and New Jersey. The altitude of Cornwall Bridge is about 500 feet.

Dr. M. D. Leonard[1] seems to believe that these western records refer to *Atherix variegata*, and if so, this species is probably the one that has been used for food by certain Indian tribes in California, as reported by the late Dr. J. M. Aldrich.[2]

[1]A Revision of the Dipterous Family Rhagionidae, Memoir No. 7, Am. Ent. Soc., p. 82. 1930.
[2]Ent. News, 23, p. 159. 1912.

NOTES ON THE HAIRY CHINCH BUG, A PEST OF LAWNS

B. H. Walden

Each summer since 1929 reports have been received of injury to lawns in Connecticut by the hairy chinch bug, *Blissus leucopterus hirtus*. The presence of this insect is usually detected by brownish spots appearing in sections of the lawn. These injured spots may increase in size until much of the lawn is covered, or a large section completely ruined, as was the case at Westport during the past season, where about 1,200 square feet of bent grass lawn was killed. Adjoining areas of lawn were of mixed grasses. Although many of the bugs had migrated to these, the grass showed little injury when examined on August 15.

Most of the Connecticut lawns which have been injured were either bent grass or a lawn mixture in which bent predominated.

The chinch bugs injure the grass by sucking out the juice. Hot, dry weather is the most favorable for their development so that the injury is most severe when the lawn grass is handicapped by a lack of water.

Figure 104. The hairy chinch bug. Left, short-winged form; right, long-winged form. Enlarged about six times.

The hairy chinch bug is about 4 mm. in length, oblong-oval in shape, nearly black in color, with the legs, beak and antennae, dark yellow to brown. The hemelytra, or wing covers, are milky white with brown veins and a black spot about midway of the outer edge. There are two forms, one with long wings and the other with abbreviated wings, the latter form being the more abundant. Both forms are shown in Figure 104.

The hairy chinch bug is an eastern variety of the true chinch bug, *Blissus leucopterus*, which frequently causes much damage to cereals, including corn, and grasses in the central and mid-western states. It is somewhat more robust than the type, has longer pubescence on the thorax and sides of the abdomen, and the femora are usually brown instead of yellow. This insect is probably present each season in the grasslands of the State. It escapes attention because of its small size and the habit of working near the surface of the ground. The injury may often be attributed to drought or some other cause. There have, however, been a number of reports of injury by chinch bugs to timothy

in the eastern United States. Specimens were received from Wolcott, August 27, 1932, where they were reported as injuring a hayfield.

The hairy chinch bug hibernates in the adult stage, crawling in between the stems of tufts of grass or under leaves and rubbish. The matted turf of bent grass furnishes an ideal protection at this time. The bugs become active in the spring when the temperature reaches about 70° F. for a few hours during two or three consecutive days. The eggs are laid on the stems of grass near the ground, or on the roots below the surface if the soil is loose. The young nymphs are reddish in color with the first two segments on top of the abdomen nearly white. After each molt the color becomes darker until the gray-black color of the last nymphal stage contrasts strongly with the white at the front of the abdomen. There are two generations of the insect during the season, although the stages overlap so that both adults and nymphs are found during the latter half of the year. Adults have been taken from April 1 to October, and can probably be found during each month of the year. Nymphs have been found from June 17 to October.

The chinch bug, like many other sucking insects, is readily killed by contact insecticides, but it is a difficult insect to control in bent grass lawns. It is necessary not only to wet all of the bugs in the grass thoroughly, but to use sufficient material to soak into the ground and kill any nymphs that are feeding below the surface.

In tests made by Dr. R. B. Friend of this department, the following formula gave satisfactory control:

Nicotine sulfate	1 quart
Soap powder	4 pounds
Water	100 gallons

On the lawns where the tests were made, it was necessary to use from 25 to 30 gallons of the solution to each 100 square feet.

FURTHER INFESTATIONS OF *Calomycterus setarius* Roelofs

M. P. Zappe

The first record of the occurrence of this insect in Connecticut was at Lakeville in 1932, when a note by Doctor Britton was published in Bulletin 349, page 448. At this time it was known to be present in Yonkers, N. Y., having been reported in 1929. When found at Lakeville, adult weevils were present in the garden and were feeding on iris, bindweed and smartweed. They were not numerous enough to cause very much injury, but had the curious habit of swarming on the sunny side of the house.

During the summer of 1935, this insect was sent to the Experiment Station from Sharon and Stratford, and was accidentally discovered by the writer in Greenwich. There were three separate infestations in Sharon, two in Stratford and one in Greenwich. All reports said that the weevils congregated on the sides of buildings, and in some cases entered the houses even though they were screened.

How this insect gained a foothold in the United States is not definitely

known. It is found in Japan and was described from there by Roelofs in 1873. Possibly it was introduced here through commerce. The adult weevil is wingless and is therefore dependent upon transportation to travel long distances. Practically nothing is known of its immature forms, either in this country or abroad.

In Connecticut the adults feed on a number of plants such as Ampelopsis, English ivy, Abutilon, Swiss chard, iris, roses, Pyracantha, clover, milkweed and chrysanthemum. As yet it has done very little commercial damage here, but may soon become sufficiently abundant to be classed as a serious pest. The larvae have never been observed and where and how they live is not known. Judging from the life history of closely related weevils, we may assume that the immature stages are spent in the ground where they may feed on roots of plants or other organic material.

The original infestation at Lakeville has not increased since 1932. Each summer when the adults are abundant and are congregating on the sides of the house, the owner has killed many of them by spraying with kerosene emulsion.

This past summer weevils were very abundant at one place in Sharon and the owner reported that they had been present for two or three years. The house was built in 1929, and all the building materials came from Lakeville. The owner believes that the weevils were introduced in the builder's supplies. This is possible, but it is also possible that they were brought in on potted plants, nursery stock or other material.

The insects were first observed in a commercial greenhouse and at a private estate in Sharon in 1935. At neither of these places were the adults abundant enough to cause any serious injury to plants. On chrysanthemums they were eating into the blossom buds and larger numbers may cause serious loss of these flowers.

The two Stratford infestations are on adjoining properties about 200 yards apart. The houses are rather new, built on a recent shore front development. The house where adults were most abundant had neither shrubbery nor garden, only a lawn. The other place had a variety of plants growing around the house, and roses, Deutzia and ivy were somewhat injured. In fact the rose bushes were practically defoliated.

At the Greenwich infestation we were requested to examine the house for termites. The tenants reported that insects, thought to be termites, were swarming on the buildings. Upon examination the latter part of October, no termite injury could be found, but a few Calomycterus weevils were found dead in spider webs around the house. A little of the characteristic feeding of the weevils was seen on forsythia bushes and maple seedlings near the house.

Soil with sod was collected at Sharon and Stratford and examined very carefully in the hope of finding eggs or larvae, but neither could be found.

This pest has become established in Towson, Maryland, and also at Allentown and Mechanicsburg, Pennsylvania. It may occur in other places, but owing to its small size, it is not likely to be noticed until it is abundant enough to cause injury to plants or to become a nuisance by swarming around and entering dwellings.

NOTE ON *Tetralopha robustella* Zeller IN CONNECTICUT

(Pyralidae, Lepid.)

G. H. Plumb

cf 7341

This pine moth was first taken in Connecticut in 1917 and has been recorded several times since. Apparently it is quite widely distributed in the United States, having been reported from Florida, Texas and Colorado, as well as from this section of the country. It seems to have been considered quite a rare insect at one time, doubtless due to the fact that the adult is seldom taken.

The wing expanse of the adult male is about 20 mm. and that of the female (Figure 105) is somewhat larger, one female measuring 28 mm. Forewing of female: General color, fuscous-black; slightly more than

Figure 105. Female moth of *Tetralopha robustella*. About four times enlarged.

basal third densely black with a tuft of grayish black scales near center and bearing on the inner basal region a fusco-testaceous area rather deeply notched on its outer margin; center third of wing gray, an irregular narrow black band crossing just within the outer margin of the area; a tuft of grayish black scales near middle of center third, from this tuft a fusco-ferruginous area to inner margin, also a small round tuft of grayish black scales in proximal costal region of area; central gray area crossed by several narrow grayish black stripes on line of veins; outer third black, fading to fusco-testaceous toward distal portion, bounded by a gray band interrupted at regular intervals by a broken, narrow, dense black stripe; fringe smoky gray, fading to pearl gray. Hind-wing: smoky black fading to smoky gray in central and basal regions. Forewing of male with the same pattern but a more grayish cast.

A fully grown larva averages slightly over 20 mm. in length. It is yellowish brown in color and bears four prominent dark brown stripes,

two on each side of the body, one lying just above the spiracular line, the other halfway between it and the mid-dorsal line. The latter stripe is not quite twice the width of the former and extends on the anal plate for a short distance. The head is light tan in color and bears a characteristic dark brown to black, stipple-like pattern. The prothoracic and anal shields are light tan in color and bear, in addition to setae, numerous dark brown dots. Coxae and trochanters of thoracic legs concolorous with ventral side of body; other leg segments darker brown. Prolegs same color as that of venter; crochets biordinal, arranged in a uniserial circle. Spiracles prominent, rimmed in black. Folds on the dorsal and lateral sides of the body marked with brown dots; each segment bearing a regular pattern of long slender setae.

FIGURE 106. Nest or frass ball of the larvae of *Tetralopha robustella*. Natural size.

Pupa about 11 mm. long, reddish brown in color. The first seven abdominal segments are somewhat coarsely punctate, except on posterior margin, the remaining segments smooth. Cremaster bearing eight hooked setae regularly arranged. Wing covers extending to posterior margin of fifth segment.

The larvae live in loosely woven, silken tubes which wind through a mass of excrement formed around the twig and enclosing the needles upon which the larvae feed (Figure 106). This mass is held together with irregular strands of silk and is sub-globular to ovoid in shape. It may be more than three inches in length. The number of larvae in such a "nest" varies according to its size. These "nests" appear on the trees

about the middle of September and apparently develop rather rapidly. The larvae feed on pine needles until about the middle of October, when they become fully grown. They then enter the ground and pupate in a somewhat flattened ovoid cell about 20 mm. long and 8 to 10 mm. wide. The cell is thinly lined with silk and covered with grains of sand and small stones.

There seems to be but one generation a year in Connecticut and the larvae apparently remain in the ground until late summer of the following year, when the adults emerge. Just where they lay their eggs is not yet known but these are probably deposited on the needles or in the bark crevices.

The insect has been recorded from small trees of red, pitch and white pine in Connecticut, and from loblolly pine in Florida. It does not seem to injure the trees to any great extent, although large numbers of the frass balls are unsightly on ornamental trees. It is possible that the stripping resulting from the occurrence of this insect on seedlings or very small or unhealthy trees will retard them to a certain extent, but it is doubtful if the infestation would ever be heavy enough actually to kill them. The infestation on ornamental pines can probably be controlled by spraying with lead arsenate before the nests are fully formed.

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FURTHER OBSERVATIONS ON THE SQUASH BUG IN CONNECTICUT

Raimon L. Beard

During the summers of 1934 and 1935 efforts were made to secure more data on the life history and ecology of the common squash bug (*Anasa tristis* DeGeer) and to find a satisfactory means of controlling this pest of squash and related cucurbits. Doubtless much of the injury attributed to the squash bug is done by other insects, such as the striped cucumber beetle (*Diabrotica vittata* Fabr.), the squash vine borer (*Melittia satyriniformis* Hbn.) and by the bacterium *Bacillus traceiphilus*. Never-

theless, the bug is very abundant in Connecticut and may cause severe burning of the foliage by feeding, even killing young plants in some cases.

There is but a single generation of the squash bug in Connecticut each year. Eggs are deposited over a period of about two months, most of them being laid during July. Elliott (1934) determined the time required for the completion of the life cycle, from oviposition until the adults emerge, to be from 36 to 67 days, with an average of 44.3 days.

The oviposition trend for the season of 1935 was determined by collecting and counting, at weekly intervals, eggs deposited on 70 hills of summer squash in a one-acre field in Southington. The hills selected were scattered throughout the field in order to get representative sam-

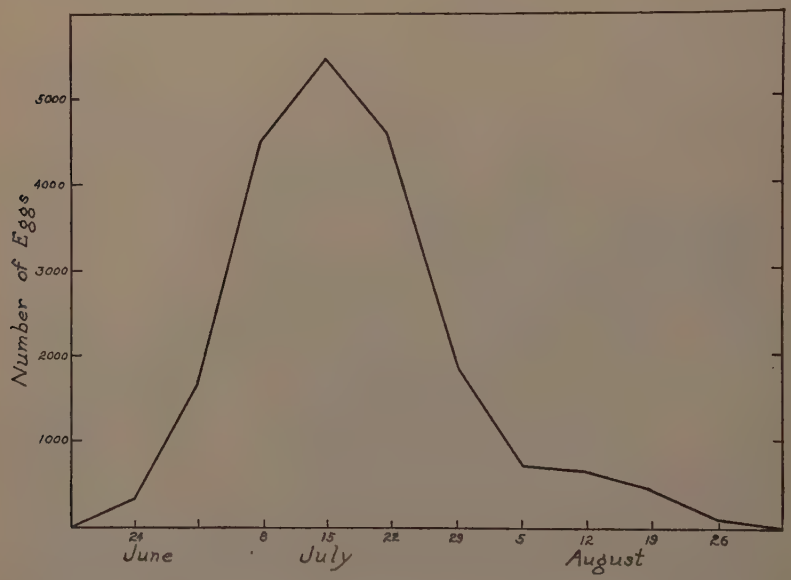

FIGURE 107. Chart showing egg-laying period of the squash bug.

plings. During the summer, 1,296 egg-clusters were gathered, containing a total of 20,015 eggs. Similar counts were made at the Experiment Station Farm at Mount Carmel on 8 hills. Here 68 egg-clusters, with 976 eggs, were collected. The average was about 15.4 eggs per cluster, but occasionally single eggs were found, and as many as 47 eggs were observed in a single group. There seems to be a decrease in the average size of the cluster towards the last of the season, roughly corresponding to the decline in oviposition. Out of 20,991 eggs kept under observation, 20,302, or about 96.7 per cent, hatched. The oviposition trend is graphically shown in the accompanying chart (Figure 107). During the period of greatest oviposition, between June 24 and August 5, the temperature showed no extreme fluctuations. The daily mean varied from 64° to 81° F.

As to the number of eggs a single female will lay in a season, Girault's (1904) estimate of 154 seems much too low a figure. A pair of bugs in

copula were caged with a squash plant on June 24. Between that time and August 5, the female laid 409 eggs. On August 5, the female was found dead as a result of parasitism, and dissection showed 10 eggs in the oviducts. The weekly oviposition of this individual was as follows:

June 24—July	1	85 eggs
July 2—July	8	112 "
July 9—July	15	86 "
July 16—July	22	60 "
July 23—July	29	66 "
July 30—Aug.	5	0 "
Total		409

Wadley (1920) found that in 1917 over-wintered females deposited on the average 502.5 eggs each, and in 1918, 419. He did not indicate, however, the number of cases from which he determined the average nor the maximum number of eggs deposited by any one female.

Copulation and oviposition by adults during the same season as that in which they develop have not been observed in Connecticut. Microscopic examination of the gonads of these adults indicates that although mature spermatozoa are present, the testes are not so fully developed as they are in the spring. The ovaries are even less completely developed.

Girault (1904), showing that the male of the squash bug is polygamous, believed that it was to be found in relatively fewer numbers. A collection of 1,000 bugs in August and September showed 499 males and 501 females, indicating that at this time, at least, the two sexes were equal in numbers. It may be that the males die off sooner than the females, but at present there is no evidence to support this. Counts made in July showed that of 198 bugs, 106 were females and 92 were males. The difference may be insignificant, for at this time of year the females are more easily seen due to their egg-laying activity.

Control

Natural checks: There are several significant natural checks against the squash bug which should be mentioned. Garman (1901) states that a bacterial parasite, *Bacillus entomotoxicon*, may cause an epidemic disease among them. The prevalence of this disease is not known, and no evidence of it was encountered in the present study.

Undoubtedly the squash bug suffers considerably as prey of some of the predaceous Pentatomid bugs. During the summer of 1935 *Podisus maculiventris* Say was present on squash in large numbers. Adults and large nymphs were frequently observed feeding on squash bug nymphs, and in the laboratory several specimens were reared to maturity on a diet of squash bugs (Figure 108). Although these predators feed on other insects as well, they may be more effective in control than are parasites. A single parasite larva can kill but a single host, whereas one Pentatomid can destroy a good many bugs in its lifetime.

Among the parasites of the squash bug, the most common is a Tachinid fly, *Trichopoda pennipes* Fabr. There are two generations of this fly in Connecticut, the first coming out as adults in the spring, usually soon after the adult squash bugs have begun their season's activity. The

parasite lays its eggs on the body of the squash bug, usually along the sides of the abdomen and thorax, but occasionally on the back, legs, or antennae. The egg is flattened on the side towards the host, and is quite firmly attached. It hatches in about 30 hours (Worthley 1924), and the larva burrows through the body wall of the host and develops within. The larval period is approximately 16 days in length, and there are probably four instars (Worthley 1924). In spite of the large size of the larva, the bug is able to withstand its presence until the larva matures and leaves the anal opening of the bug, dropping to the soil to pupate. The bug, however, dies shortly afterward.

Reproduction is not completely retarded by the presence of the parasitic larva. The female bugs continue to lay eggs, and often lay the major portion before death intervenes. Because of this fact, the parasitism of this generation of flies may not be significant as a check against the bug. Observations made at Mount Carmel and Southington indicate parasitism by the first generation of about 53.5 per cent of the host. Other reports indicate that at times the rate may be as high as 80 per cent (Worthley 1924).

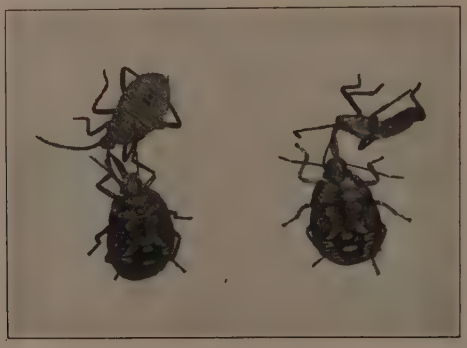

FIGURE 108. Nymphs of the spined soldier bug, *Podisus maculiventris*, preying upon immature squash bugs. Twice natural size.

The pupal stage of this generation of the parasite lasts about a month, and the appearance of the new generation of flies is usually synchronized with the appearance of the adult squash bugs. Eggs are laid on squash bug nymphs of the fourth and fifth instars as well as on adult bugs. The nymphs usually die before reaching maturity if thus parasitized, but the adults harbor the larvae during the winter, dying the next season before being able to oviposit (Worthley 1924). Thus it is this generation of Tachinids that does the most good in checking the bug. Of course there is the possibility of some of the parasite eggs being cast off unhatched with the nymphal skin upon molting, but since the parasite egg hatches in about 30 hours and the duration of the fourth instar of the bug averages about 8 days, and that of the fifth, 9 days, comparatively few eggs are thus lost. The collecting of adult bugs is not a satisfactory method of determining the percentage of parasitism of this generation because many of the parasitized nymphs die. Such a method does give, however, some estimate of the number of adults that are affected. A collec-

tion of 283 bugs made on August 29 showed that only 18, or 6.4 per cent were parasitized.

Three species of Hymenoptera are known to parasitize the eggs of *Anasa tristis*. These are *Hadronotus anasae* Ashm., *H. carinatifrons* Ashm., and *H. ajax* Gir. (Girault 1904, 1920). Of these, *H. anasae* is the most common, and although its known distribution and habits indicate its probable presence in Connecticut, it has not been reported here.

Artificial control: No method of controlling the squash bug has yet proved very satisfactory. In the past, mechanical means such as hand picking, the use of trap boards and trap crops, and clean farming have been widely used because of the difficulty of killing the bugs with sprays and dusts. In Texas, Little (1927) claimed good control with calcium-cyanide-A dust, using the concentrated dust applied in the open air at the rate of one and one-half ounces to the hill. He further claimed that no severe damage to plants occurred. In an effort to find an effective chemical control for the bug, Elliott (1934) conducted laboratory tests using a wide range of dusts and sprays. Of the dusts, he found calcium-cyanide-A to be the most promising. Of the sprays, a kerosene extract of pyrethrum gave very favorable results. Accordingly, these were given more extensive field tests in 1935.

Several tests were made with calcium cyanide dust, both at the Experiment Station farm at Mount Carmel and at Southington, but none proved it to be satisfactory. When the dust was used in concentrated form, very severe burning of the foliage resulted, and only the bugs in the first and second instars succumbed. Bugs of later instars became stupefied, but practically all of them recovered in from one to six hours. Little recommended that prior to the dusting, the young bugs, which cluster on the undersides of the leaves, be knocked to the ground, thus avoiding the necessity of applying the dust directly on the leaves. Undoubtedly this method would reduce the burn, but it would not increase the effectiveness of the dust against the larger nymphs and adults.

The kerosene extract of pyrethrum must be emulsified with soap before diluting. If the emulsion is not properly prepared, the kerosene floats on top of the mixture and the soap settles out as a gummy residue. This extract was used at a dilution of 1:800, with soap diluted to 1:400. Two rows of summer squash in the middle of an acre field were given four applications of this spray at 10-day intervals, the first application being on July 10. Such a test plot is not very satisfactory, but it was the only arrangement by which a crop yield could be recorded. Although the two rows adjacent to the sprayed rows were treated somewhat superficially, migration was not completely checked, so the evaluation of the spray is somewhat inaccurate. The spray program and conditions under which the spray was applied follow:

July 10. 40 gallons of spray applied with barrel sprayer. 11:00 A. M. to 2:00 P. M. Temperature, 79°—83° F. Humidity, 78—73%.

July 20. 55 gallons of spray applied with barrel sprayer. 10:00 A. M. to 12:00 N. Temperature, 82°—87° F. Humidity, 77—69%.

July 30. 50 gallons of spray applied with barrel sprayer. 11:00 A. M. to 2:00 P. M. Temperature, 72°—79° F. Humidity, 52%.

August 9. 100 gallons of spray applied with power sprayer, 300 lbs. pressure at pump, using quad nozzle. 11:00 A. M. to 12:00 N. Temperature, 81° F. Humidity, 45%.

Crop yields were recorded for these two rows of sprayed squash and also two check blocks, each consisting of two rows equivalent to the sprayed block. The record was made by field workers as they harvested the crop. The data obtained are as follows:

TABLE 16. CROP YIELD
(In pounds of squash)

	Check No. 1 (175 hills)	Check No. 2 (188 hills)	Spray (184 hills)
July 15—21	385	365	386
July 22—28	348	423	335
July 29—Aug. 4	76	86	82
Aug. 5—12	151	168	210
Aug. 13—22	77	222	287
Aug. 23—28		45	34
Total	1037	1309	1336

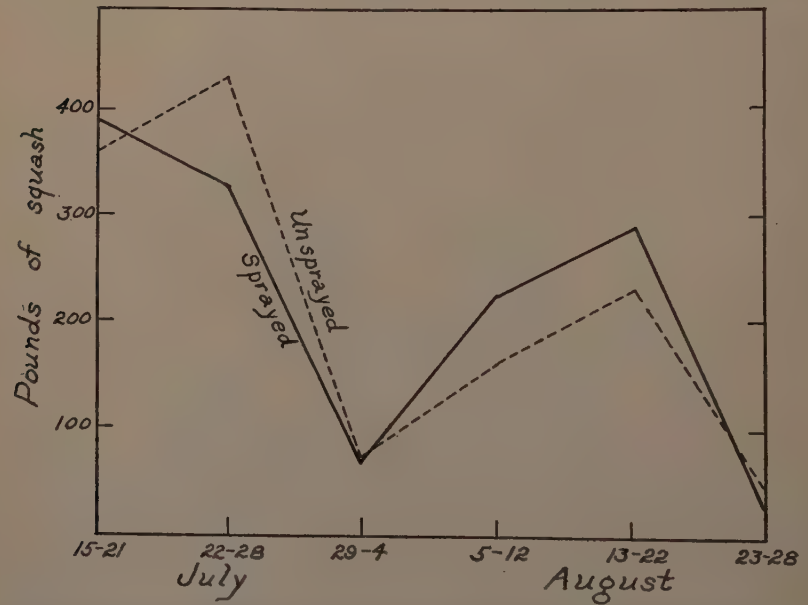

FIGURE 109. Chart showing yields of squash on sprayed and unsprayed plots.

The low yield for the week of July 29 to August 4 may represent the failure of the workers to record the yield for a few days, rather than an actual diminution in the crop production. Likewise the extremely low yield of Check No. 1 after August 12 may be explained in the same way. Consequently, this plot can be disregarded in this discussion. If the other check plot and the sprayed plot, weighted so as to compensate for the difference in number of hills, are compared, the total yield of squash from the sprayed block is only 4.09 per cent higher than that from the check. Further analysis of the data, however, seems to indicate more favorable results.

During July there was no noticeable damage to the plants, and during this month the check block produced 6.52 per cent more squash than the sprayed block. During August, however, the greater part of the season's eggs had hatched, nymphs in the later instars were becoming abundant, and their feeding was much in evidence. For this period, the sprayed plants produced 25.3 per cent more squash than the check. The accompanying graph (Figure 109) shows this comparison.

This lower yield of the sprayed plants in July cannot be explained. It cannot be attributed to the spray, for no correlation with the dates of application is evident. Had a whole field been sprayed so that migration from unsprayed plants would be prevented, the effect of the spray might be more accurately evaluated. On the basis of this work, however, the increased yield of squash obtained is not sufficient to justify the use of this spray if the value of the crop is considered.

Further laboratory tests indicate that either anabasine sulfate used 1:100 with soap 1:400, or a spray utilizing the active principle of BB[1] butoxythiocyanodiethyl ether (Lethane 420) used 1:500 with a sulfur-carbon disulfide spreader, might be effective in killing adult bugs as well as nymphs. These materials were not tested in the field. With these concentrations, extensive spraying of squash would be very expensive, but if they prove to be effective against adult bugs in the field, as they seem to be in the laboratory, a single application, applied before oviposition is very far advanced, would be as effective as the four applications of the kerosene extract of pyrethrum.

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FURTHER OBSERVATIONS ON TERMITE DAMAGE

NEELY TURNER AND M. P. ZAPPE

The eastern subterranean termite, *Reticulitermes flavipes* Kollar, has continued to cause serious damage to buildings in Connecticut, and 25 lots of termites from 21 towns were received for identification. During the past year, 113 infested buildings have been examined on request of the owners. These were located in 42 towns in all sections of the State. Twelve were so seriously injured as to be structurally unsafe. Total damage to the 113 buildings was estimated at approximately $100,000, and $43,000 was spent in repairs and termite-resistant construction in 16. The smallest cost was $25 for repairs to garage door posts, and the largest, $8,000 for replacements and termite prevention in a two-story brick building. During construction five new dwellings were made termite-proof by the use of metal shields. The additional expense for this protection averaged about $300 for each building.

The record of the buildings found infested is given in the accompanying table This record cannot be used as an indication of the distribution of termites in Connecticut. It does show the increasing amount of termite injury and increasing interest of building owners in the problem.

In addition to these inspections, seven buildings were examined and no termites found; seven were infested by carpenter ants, two by house ants, two by Crabro wasps, and four by powder-post beetles. In each of these cases the owner reported a termite infestation.

During the year many consultations have been held with architects, contractors and trustees of public and semi-public institutions in regard to prevention of termite injury. In some cases it was necessary to study conditions very carefully in order to adapt termite control methods to future building plans.

Further information about termites and how to control them may be found in Bulletin 382, which has just been published with illustrations.

TERMITE-INFESTED BUILDINGS IN CONNECTICUT, 1935

Fairfield County	
Bridgeport	5
Brookfield	1
Darien	1
Easton	1
Fairfield	2
Greenwich	5
New Canaan	1
Newtown	1
Norwalk	1
Stratford	2
Westport	4
Wilton	2
	26
Hartford County	
Berlin	1
Farmington	3
Hartford	5
Manchester	5
New Britain	14
Simsbury	1
Windsor	1
	30
Litchfield County	
New Milford	1
Woodbury	1
	2
Middlesex County	
Cromwell	1
Essex	1
Portland	1
Saybrook	1
	4
New Haven County	
Branford	1
Cheshire	2
Hamden	7
Meriden	3
Milford	7
New Haven	14
North Haven	1
Orange	1
Wallingford	1
Waterbury	3
West Haven	1
Wolcott	1
	42
New London County	
Groton	3
Lyme	2
Norwich	2
Old Lyme	1
	8
Tolland County	
Mansfield	1

Total For State — 113

THE RELATION BETWEEN THE HIBERNATING FEMALE AND THE SURVIVAL OF THE SPRING GENERATION OF THE SPRUCE GALL APHID

R. B. FRIEND

It has long been known that the overwintering stem mother (fundatrix) of the spruce gall aphid (*Adelges abietis* L.) affects the growing shoot in the spring, causing the needles to swell. This effect is evident when growth begins, even before the buds break. Those needles immediately above the stem mother enlarge, initiating the formation of the gall which is completed by the action of the nymphs of the next generation (gallicolae). Several questions arise concerning this phenomenon. At what time is the influence of the stem mother first felt? How far does gall formation progress under the influence of the stem mother alone? Do the nymphs (gallicolae) attach to the previously swollen needles only? Can these nymphs establish themselves on needles not previously affected by the stem mother? These questions all have a bearing on the formation of galls on spruce, and investigations are now being carried out in an attempt to answer them. A brief summary of the results attained to date is given here.

The work was carried out in 1935 at the Experiment Station farm at Mount Carmel, using a row of Norway spruce trees about eight feet high and set about three feet apart. These trees had been set out for several years; some of them were well infested with galls and the branches of adjacent trees overlapped. The individual trees differed in regard to susceptibility to aphid attack and time of breaking of buds in the spring, although no correlation was observed between these two phenomena. Two of the trees utilized were well infested and bore many old galls. One of these showed earlier shoot development than the other. A third tree was lightly infested and bore relatively few old galls. The shoots developed early. The fourth was not infested with living aphids in the spring of 1935 and had never borne any galls. It may be considered immune to aphid attack. Its shoot development was about midway between the earlier and later of the other trees. In addition to the work carried out on the trees themselves, twigs freshly cut from them were used in experiments in the insectary.

The procedure involved the removal of hibernating females at different times, the removal of females and eggs, the transfer of eggs to other twigs, and the transfer of eggs to shoots from which either the swollen needles or the normal needles had been removed.

The fundatrices were removed from 10 twigs April 18, before growth started in the spring. There was a total of 28 buds on these twigs, and in only one case were any swollen needles present when the shoots were examined in June. On this shoot four swollen needles and a few live nymphs were found, so a fundatrix may have been unwittingly left on April 18. The remaining 27 shoots were normal and showed no signs of ever having been infested. The fundatrix, which establishes itself on the twig late in the summer or early in the fall, exerts no visible effect on the new shoot before growth begins in the spring following.

At the beginning of shoot elongation and the oviposition period of the aphid, May 8 and 9, the fundatrices and eggs were removed from 20 twigs involving 30 new shoots. The shoots were examined in June and July. Four failed to develop. Swollen needles but no nymphs (gallicolae) were found on 14. The swollen needles were pubescent, as are those which form complete galls, but had not enlarged enough to touch one another. Later in the season they became shrunken and distorted. On each of 12 shoots a few nymphs were found and a small gall had developed. These nymphs may have come from another infested twig on the same branch or from eggs which were overlooked in May. It is evident that the needles affected by the fundatrix alone do not swell sufficiently to form a gall (this has been previously reported by the author and others), hence that no gall forms if nymphs are absent, and that this hypertrophy of needle tissue takes place only when a fundatrix is present after growth starts in the spring. The appearance of these small galls and the location of the nymphs indicate that the extent of hypertrophied tissue, in regard to both length of swelling along an individual needle and the number of needles swollen, is governed by the action of the fundatrix. The nymphs apparently do no more than augment this effect. The removal of fundatrices and eggs from 10 twigs in the middle of the oviposition period and at the time the buds were breaking

open and some of the shoots projecting beyond the bud scales, May 15, gave essentially the same results as above.

On May 22 the swollen needles were removed from 10 shoots without disturbing the fundatrices and eggs. The eggs had not begun to hatch on five shoots and hatching had just started on the other five. When these shoots were examined June 4, there were no swollen needles or live nymphs except in one significant case. On one shoot three live nymphs were found on the butt of a swollen needle left after the cutting operation of May 22. In all cases the eggs had hatched and dead nymphs were common. Untreated but infested shoots showed the normal course of gall development. The results indicate the necessity of previously swollen needles for the survival of the nymphs which will live in the gall.

Further experiments were carried out by transferring eggs to the shoots under the following conditions: (1) to uninfested twigs of the same tree; (2) to twigs on an immune tree; (3) to uninfested twigs on another infested tree; (4) to twigs, on the same tree, from which fundatrices and eggs had been previously removed; (5) to twigs, on another tree, from which the eggs and fundatrices had been previously removed. In no case where a fundatrix had not been present at the base of the shoot did any nymphs survive or any swollen needles develop. When the eggs were transferred to twigs from which fundatrices and eggs had been previously removed, the nymphs survived and normal galls developed in 10 cases, a small gall with a few live nymphs developed in one case, and no nymphs survived in one case.

Another series of experiments was carried out with cut spruce twigs in the insectary during May. All tips were kept in vials of water and remained fresh and green throughout the course of the experiment. In no case had any eggs hatched at the beginning of the experiment. Eggs and fundatrices were removed from seven shoots and to these eggs were transferred. Live nymphs were later found in normal gall cavities on all these shoots. The normal needles (those not affected by the fundatrices) were cut from three infested shoots and the swollen needles left. The eggs and fundatrices were removed and other eggs transferred as above. Live nymphs were later found in normal gall cavities on these shoots. The swollen needles were cut from four shoots from which eggs and fundatrices had been removed and other eggs were transferred to these. No swollen needles developed and no nymphs survived except in one case where a few nymphs settled on a fragment of a swollen needle left after cutting. Eggs were transferred to 13 uninfested shoots cut from the same tree as that furnishing the eggs. All the eggs hatched but no nymphs survived and no swollen needles developed.

It is evident that the effect of the fundatrix occurs when growth begins in the spring and that all of the needle tissue which will later go into gall formation is first affected by the fundatrix. Furthermore, the gallicolae cannot establish themselves on any needle or part of a needle not previously affected by the fundatrix (the tips of the affected needles do not usually become swollen and do not usually take part in the formation of the gall). For the formation of a complete gall, the presence of gallicolae is essential, for in their absence the needles do not swell sufficiently to touch each other, and later they become shrunken and

distorted. The extent to which the shoot becomes galled, and hence the ultimate extent of injury, depends on the extent of the effect of the fundatrix, for gallicolae cannot disperse over the shoot and affect needles at random.

COÖPERATIVE EUROPEAN CORN BORER EGG PARASITISM INVESTIGATION

J. C. Schread

This article is a summary of a single season's preliminary investigation of corn borer egg parasitism by Trichogramma conducted in coöperation with the Associated Seed Growers of Milford and Dr. A. W. Morrill of Glendale, Cal. All or any portion of 300 acres of sweet corn as well as

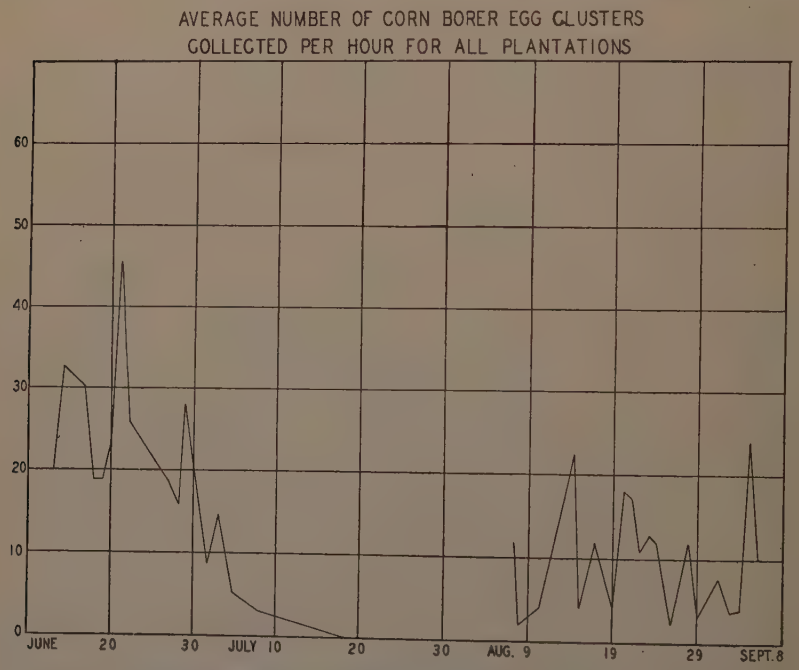

Figure 110. Chart showing number of egg-clusters of the European corn borer collected per hour in all plantations under observation.

laboratory space and equipment was made available by the Seed Growers Association. Dr. Morrill supplied 500,000 *Trichogramma pretiosa* Riley.

The plantations selected for release of parasites and likewise the adjacent and check areas were with few exceptions late maturing varieties of corn. At weekly intervals all plantations were scouted for egg-clusters, the collected material being retained under laboratory conditions sufficiently long for determining the amount of parasitism. The total number of corn borer egg-clusters collected for the first brood was 1,489,

containing 24,008 eggs; and for the second generation, 3,395, containing 40,885 eggs. Parasite release was at the rate of 10,000, 20,000 and 30,000 per acre.

Data accumulated throughout the season were not significant from the standpoint of colonization. The average parasitism in the adjacent areas was slightly higher than in the colonized areas, whereas during the second brood the results were the reverse. In the check plots the average parasitism during the second brood was approximately five times as great as found in the colonized areas.

The following table shows the progress of the infestation in check plots during the summer, together with the percentage of parasitism. Table 18 gives a general summary of the results obtained in the experiment as a whole.

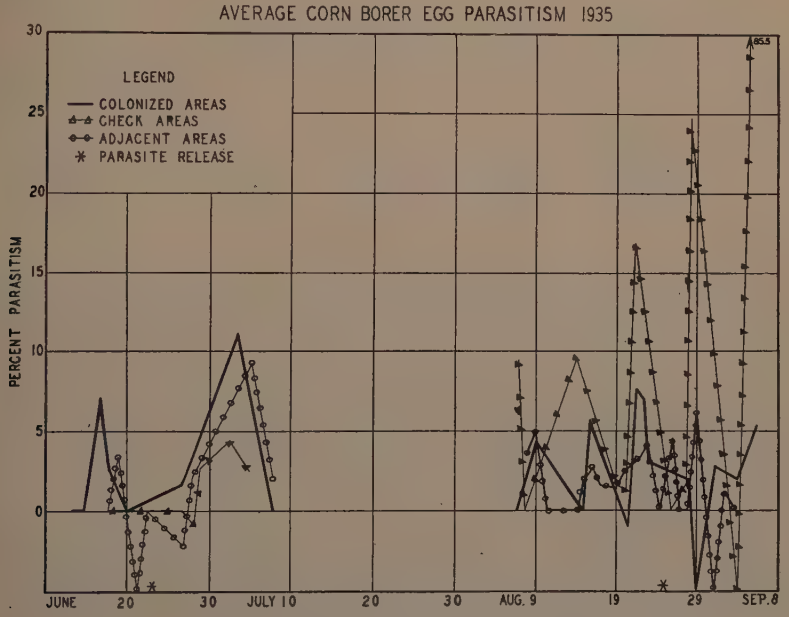

FIGURE 111. Chart showing average parasitism of the eggs of the European corn borer by Trichogramma in 1935.

TABLE 17. TRICHOGRAMMA PARASITISM OF CORN BORER EGGS IN CHECK AREAS

Dates	No. clusters collected	Man hours to collect	Total No. eggs	Egg-clusters parasitized	No. eggs parasitized	Per cent parasitism
June 8	27	1	440	0	0	0.0
" 19	29	1	460	0	0	0.0
" 29	28	1	508	2	12	2.3
July 2	6	1	77	0	0	0.0
" 18	0	3	0	0	0	0.0
Aug. 7	13	4.5	250	0	0	0.0
" 14	10	4	100	2	20	20.0
" 21	25	3.5	330	1	24	7.0
" 27	2	3.0	24	0	0	0.0

TABLE 18. SUMMARY OF PARASITISM OF EUROPEAN CORN BORER EGGS BY TRICHOGRAMMA

Colonized Areas

First brood			Second brood			Combined
Maximum	Minimum	Average	Maximum	Minimum	Average	season
10.8	.3	2.25	7.3	.3	2.74	2.49

Adjacent Areas

First brood			Second brood			Combined
Maximum	Minimum	Average	Maximum	Minimum	Average	season
19.1	.25	2.36	9.9	.31	1.78	2.07

Check Areas

First brood			Second brood			Combined
Maximum	Minimum	Average	Maximum	Minimum	Average	season
8.9	.2	1.14	5.5	.39	12.27	6.7

CONDITIONING A BASEMENT ROOM FOR BREEDING INSECTS

J. F. TOWNSEND

For a number of years, control of temperature and humidity in a basement room has been needed for breeding insects. Attempts at modifying the room conditions by the use of cold water, ice and calcium chloride were made with inadequate apparatus but indicated interesting possibilities for control where applicable. Control has been obtained for the past year and a half by using a partially automatic arrangement employing a thermostat and a humidistat, with a separate apparatus each for heating and humidifying, and electrical refrigeration with direct expansion coil for cooling and dehumidifying.

The arrangement has been satisfactory for the most part for breeding parasites of the Oriental fruit moth, rearing corn borers and spruce sawflies, and for study of the apple maggot. The room has also been used in a limited way for insecticide tests where it is necessary to maintain temperature and humidity following applications.

The laboratory room, which is of about 1,300 cubic feet capacity, is in the basement on the north side of a substantial masonry building, about 3.5 feet below grade level There is a large window with storm sash, a door to the hallway, and a door to an adjoining room. The walls are of cement plaster over hollow tile, with floor and ceiling of concrete. There is a sink with hot and cold water service and a steam radiator with modulating valve. A large steam main near the ceiling radiates a great deal of heat into the room when the central heating plant is in operation. By reason of its location, the room is comparatively free from wide daily temperature variations. On the other hand it lacks certain desirable features for air conditioning, such as special insulation, vestibules for doors, and a vent for admitting outside air. Some of the equipment used in breeding and rearing insects is kept constantly wet and gives off a great deal of moisture.

For air circulation, an ordinary 12-inch desk fan is operated at slow

speed. Air circulation is needed particularly in winter to prevent stratification of the air because of heat from the steam main near the ceiling.

The heating apparatus consists of an inexpensive automobile radiator through which hot tap water is circulated under operation of a solenoid valve with thermostat control, and a desk fan to circulate air over the radiator surface. Although not highly efficient in heat transfer, this improvised apparatus is satisfactory for present uses. The radiator has also been used at times for cooling by the circulation of cold tap water. Electric heating apparatus was not used because of the limited capacity of the circuits, although it is more compact and more easily installed.

The humidifying apparatus consists of a spray head over the sink, using hot tap water under the operation of a solenoid valve with humidistat control. A motor-driven mechanical evaporator of the whirling disc type has also been used effectively.

The equipment for cooling and dehumidifying is a mechanical refrigerating apparatus, using a low pressure refrigerant, and designed for room-comfort cooling. The rated heat absorbing capacity, which is approximately that of a ton of ice over a 24-hour period, is nearly three times the amount required for present conditions. Excess capacity was desired to provide for operating with the use of other materials imposing a greater load, such as potted plants, or at other conditions of temperature and humidity. The compressor-condenser unit, of water-cooled type, is operated by a 1.5 horse power single phase electric motor on a 220-volt alternating current circuit. It is located in a room across the hallway from the controlled room, and the refrigerant lines are led across the hallway in a large pipe, together with a pipe for the waste cooling water from the condenser and the electrical control wires.

The unit cooler, which is suspended near the ceiling in the controlled room, is a direct expansion coil with fan for air circulation, designed to operate at a few degrees above freezing and to remove a large amount of moisture from the air by condensation in proportion to the sensible heat absorbed. Experimental operation to increase the relative proportion of dehumidifying by slowing down the fan speed gave a slight gain, but was not worth the trouble. Attempts at increasing the absorption of sensible heat by adjusting the expansion valve for higher evaporator coil temperatures gave very little gain up to the limit where mechanical troubles developed.

The operation of the refrigeration apparatus in connection with temperature and humidity control is as follows: For lowering the dry bulb temperature, the apparatus is operated under thermostatic control and the accompanying loss in humidity is compensated for automatically by action of the humidifying apparatus under control of the humidistat. Similarly when operated under control of the humidistat, the heat loss is compensated for. The necessary heat is supplied automatically at present by operation of the heating apparatus previously mentioned. Partial arrangements have also been made for utilizing the heat absorbed by the condenser cooling water, by circulating this water through a radiator located in the stream of cold air from the unit cooler.

Instruments for electrical control, used on line voltage (110 volts, a. c.), consist of a thermostat and a humidistat, each equipped for snap

action between the high and low contacts and available for control operation under either the high or the low contact circuit. The system is thus only partially automatic in that it is necessary to choose whether the thermostat is to be used for controlling cooling or heating apparatus, and the humidistat for lowering or raising the humidity, and to set the instruments accordingly by manual switches. Additional equipment, such as thermal time delay relays, can be installed if fully automatic control is required. Circuits from the control instruments are led to a large box where a fuse block, a distributing panel, relays and switches are mounted, connections made for permanent circuits to the 110 volt line, the compressor, the unit cooler, and to special outlets for plugging in circuits for auxiliary control apparatus for heating, cooling, humidifying, dehumidifying and air circulation. The purpose is to secure as flexible a wiring system as possible, to allow for any changes in control operation. Double pole relays are provided for the instrument circuits to permit operation of a single piece of apparatus under control of one or two circuits without interfering with other apparatus. On account of the greater relative importance of temperature in a great deal of biological work, provision has been made for a low temperature cut-out, consisting of a relay normally in a closed position with thermostatic control, to prevent operation of the compressor for dehumidifying purposes if the temperature falls too low through failure of the heating apparatus. This cut-out is not in use at present.

Operation under this partially automatic control system has proved practicable for most seasons of the year at the desired temperature and humidity on account of certain special factors influencing the condition of the room. The room is not only free from wide daily temperature variations, as previously mentioned, but there is a continual cooling and humidifying load when the central heating plant is in operation, and a continual dehumidifying load in the warm months due to the combined effects of the climate, dampness from the ground and the character of the material introduced.

In winter the refrigeration apparatus has been operated under the cooling control circuit of the thermostat, and moisture has been supplied under the humidifying control circuit of the humidistat. In summer the refrigeration apparatus has been operated under the dehumidifying control circuit of the humidistat. In the course of this dehumidifying action enough sensible heat has also been removed so that additional heat has been called for by the thermostat, even in the warmest weather experienced in the last two summers. During variable spring and fall weather, control has been difficult and has required constant attention. Success has depended on a fortunate anticipation of weather changes, together with certain additional means to modify the room conditions. By supplying an excess of heat under manual or instrument control, it has sometimes been possible to secure close control in mild variable weather under the winter type of operation, or by supplying an excess of moisture under the summer type of operation.

The results of operating the equipment have been for the most part satisfactory for the work in hand. The conditions desired, 76° F. and 64 per cent R. H., have been attained sometimes for a week with a total variation or spread not exceeding 1.5° F. and 3 per cent R. H., as re-

corded on a hygrothermograph. As checked occasionally by other instruments in the room, the actual variations, particularly in the case of humidity, have been slightly greater than those recorded. In general the best results have been secured in the summer. In winter, under good conditions for operating, the humidity curve has shown a more pronounced saw-tooth pattern, but within the limits mentioned above. For brief periods in the spring and fall, on account of the limitations of the partially automatic control system for responding to the widely varying conditions, results have been irregular, with total variations up to 4° F. and 5 to 10 per cent R. H.

At any time of the year when the conditions in the rest of the building are very different from those in the controlled room, the control balance is apt to be upset by frequent opening of the doors, particularly in the case of the door located close to the control instruments. Irregularities in the humidity curve have usually resulted in winter, and the frequent operation of the refrigeration apparatus for short periods in summer. Irregularities have also been caused by occasional opening of the window to air the room. Vestibules for the doors and a vent with small blower for admitting outside air under regulation would afford more even control. Mechanical difficulties with the apparatus have also caused irregular action. There have been occasional brief rises of 4 to 6 per cent in the humidity curve, attributable to sticking of the humidistat contacts. The most serious failures have been due to the occasional blowing of the fuse on the 220-volt line for the compressor motor, due to causes not fully determined to our satisfaction. The blowing of this fuse, while stopping the action of the compressor, under the present wiring system does not prevent the operation of the unit cooler fan, which continues to run and causes rapid evaporation of any moisture present in the unit cooler, with a resulting rise of 8 to 12 per cent in the humidity curve. A special relay on the 220-volt motor circuit to prevent operation of the unit cooler fan when the compressor is not running would be of advantage in humidity control.

Among the factors that seem of importance in influencing the regularity of control are: Starting and stopping the fans in cycle with the control of heating or cooling coils; the proper relative positions of the control instruments and the other apparatus; and the proper capacity of the various pieces of apparatus in relation to the load.

The excess capacity of the refrigerating unit, as previously mentioned, was partly to provide for operation at lower temperatures, but no trials have been made. From observations of heat transfer through the walls in connection with other work, it seems probable that insulation would be needed, as well as vestibules for the doors, for effective operation at temperatures as much as 20° below that of the surrounding rooms. Actual operations have been confined to a narrow range of conditions only.

Our experience in operating this air-conditioning equipment, although limited, would seem to indicate that it is feasible to adapt small commercial refrigerating units with direct expansion coils for close control of temperature and humidity under suitable conditions, and that a fully automatic system can be installed for less than half the cost of the standard water-spray, air-conditioning equipment. This type of apparatus has special advantages for installation in relatively small rooms where

space is limited. There are also possible advantages in using equipment available on the general market, and for which ordinary repairs can be handled by a local service organization. Although the use of these small refrigerating machines is becoming more widespread, there may still be the difficulty, as experienced in our case in interviewing a number of distributors, of securing information as to the possibilities of operating the machines for control of both temperature and humidity. For this reason the operation of our control system has been given in detail in case it may be of interest to others with similar problems.

MISCELLANEOUS INSECT NOTES

The Black Widow Spider. On June 25 a female specimen of the black widow spider, *Latrodectus mactans* Fabr., was received from Norwichtown. This is one of the poisonous spiders that live in Connecticut, but is rarely seen, and only five records for the State are available, as follows: Killingworth, 1 specimen; East Haddam, 2 specimens; Norwichtown, 1 adult female, June 25, 1935; Leete's Island, 1 immature female, September 29. [W. E. Britton]

Damage by Strawberry Weevil. Injury to strawberry plants was reported from Burlington in June. The insect responsible proved to be the strawberry weevil, *Anthonomus signatus* Say. The females lay eggs in the buds and then partially sever the stems near the buds. Later the buds break off and drop to the ground. The injury was most severe on the margin of a new plantation where it adjoined an older one. The earlier buds had escaped, but the later buds were severely injured. On a three-acre field the loss was estimated at about 20 per cent. [M. P. Zappe]

Outbreak of Say's Blister Beetle. A report was received from Meriden, June 12, that curious beetles were devouring the foliage of an apple tree. I visited the place at once and found many adults of Say's blister beetle, *Pomphopaea sayi* Lec., feeding on both apple and wild cherry foliage. The apple tree was on a lawn and had been partially defoliated. The owner had sprayed the tree just before my visit and there were many dead beetles on the ground underneath it. This insect is occasionally reported as abundant in small areas, but it seldom does much damage. The last record of its occurrence was in 1932, when it appeared in Danbury and Litchfield. [M. P. Zappe]

Bagworm in New Haven. In the Thirty-Fourth Report of the State Entomologist (Bulletin 368), page 257, is a note regarding the appearance of the bagworm, *Thyridopteryx ephemeraeformis* Haw., on Norway maple trees in Bridgeport. On July 23 this insect was found to have partially defoliated four or five small Norway maple street trees in one block near the western end of Congress Avenue, New Haven. The trees were sprayed and further injury prevented. Specimens on arborvitae were received from Westport, October 9. For a more complete account of this interesting insect, the reader is referred to Bulletin 378 on the Eastern Tent Caterpillar, which contains a brief description and illustration of the bagworm. [W. E. Britton]

Borer in Cat-tail. On August 2 a specimen of a borer in the common cat-tail was received from a correspondent in Norwichtown. The borer had pupated before reaching the Station. The brown pupa was slightly less than an inch in length and with a prominent blunt spine on the head. On August 13 the adult emerged and seemed to be a male of *Nonagria oblonga* Gr., of the Family Noctuidae. The moth is uniformly grayish buff or light brown without conspicuous markings. It has a long body, rather narrow forewings and a wingspread of one and one-half inches. The prominent conical projection on the front of the head between the eyes is a structure common to all moths of the genus Nonagria, and is thought to be used in working its way out of the pupa case. [W. E. Britton]

FIGURE 112. Chrysanthemum leaves mined by *Agromyza maculosa*. Natural size.

A Leaf Miner of Chrysanthemum. When inspecting a nursery in Hamden, September 3, Mr. Zappe was asked to look at the chrysanthemum plants in a greenhouse. Some of the leaves were infested by small larvae that made a blotch mine, often involving the entire leaf as shown in Figure 112. The insect responsible is known as the burdock leaf miner, *Agromyza maculosa* Malloch. Although primarily a pest of burdock, this insect is very destructive to chrysanthemum plants under glass. The adult is a small two-winged fly, and little is known about its life history. The owners of the greenhouse had tried to control the pest

by removing and burning all infested leaves, but a simpler remedy is to spray the plants with nicotine sulfate every 10 to 12 days as long as the foliage injury continues. [W. E. Britton]

Abundance of a White Geometrid Moth. For several weeks in the summer, the writer noticed frail whitish moths resting on the leaves of shrubs in his garden and on the sides of the garage. This moth was *Physostegania pustulata* Guen. (Figure 113), of the Family Geometridae. During July this species was abundant in Waterbury in company with the snow-white linden moth, *Ennomos subsignarius* Hubn., and both were attracted to lights in great numbers. On July 26 about 30 specimens were received from Waterbury, collected around lights. On August 20, a specimen was received from Norfolk, where it had also been plentiful. The larva is recorded as being green, less than half an inch in length, and feeding on the leaves of maple. No reports were received of injury to maple foliage around Waterbury where the moths were present in great numbers. [W. E. Britton]

FIGURE 113. Adult of *Physostegania pustulata*, a Geometrid moth. Twice natural size.

FIGURE 114. The elm lacebug. Ten times enlarged.

Abundance of Elm Lacebug. The elm lacebug, *Corythucha ulmi* Osb. & Dr., was unusually prevalent on elm trees in the northwestern portion of Connecticut in August and September. The abundance of this insect was first reported by Philip P. Wallace, July 23. Mr. Wallace, as field supervisor of the Dutch elm disease scouts, observed the insect in several places. The foliage of elms in Sharon was brown, July 23, because of it. On September 13, Mr. Plumb observed this lacebug as severely infesting elms at West Cornwall, where there were many adults on each leaf. At first it was thought that only the elms in the stream valleys were involved, but further observations showed that trees on higher ground were likewise infested. The elm lacebug is shown in Figure 114 and the injured leaves in Figure 115. [W. E. Britton]

Injury to Rhododendron Seedlings. On June 14, a report was received to the effect that rhododendron seedlings in Clinton had been chewed, accompanied by specimens of the pest considered responsible.

The specimens were somewhat crushed but appeared to be a common species of sowbug or pill bug, *Oniscus asellus* Linn., a small terrestrial Crustacean of the Order Amphipoda. As a rule these little creatures live in moist places and feed upon decaying vegetable matter. They are common under the loose bark of logs and stumps and around heaps of rubbish and compost. However, they are known to feed occasionally on tender plants and thus cause some injury. Perhaps a good method of control is to treat sliced potato, turnip or carrot with white arsenic or paris green and place them about among the plants, covered with pieces of board, flat stones or sods. The sowbugs will feed upon the poisoned vegetables and some of them will be killed. [W. E. Britton]

FIGURE 115. Elm leaves injured by the elm lacebug. Natural size.

Structural Wood Injured by Powder-post Beetles. Large beams in colonial houses commonly show injury of powder-post beetles, *Lyctus* sp. Their work is usually confined to the sapwood of hand-hewn hardwood lumber. However in March, 1935, a house in Portland was found to be badly damaged by these beetles. The first floor joists were mostly sapwood and this portion of each joist was entirely powdered by feeding of the beetles (Figure 116). The building was so seriously weakened that new joists were required to provide adequate strength. The building was about 75 years old. In Newtown, a section of the second floor of a barn gave way in November, 1935, due to injury by powder-post beetles.

The flooring was mostly sapwood and had been in place for many years. In both cases no beetles were found and therefore the species responsible for the injury could not be determined. [N. Turner and M. P. Zappe]

Forest Tent Caterpillar. In the Report of this Station for 1934, page 249, is a mention of the occurrence of the forest tent caterpillar, *Malacosoma disstria* Hubn., in the vicinity of Meriden. Apparently this insect was even more prevalent in 1935. The writer saw a few caterpillars crawling in his own garden in New Haven, and several reports were received indicating that this insect was fairly common throughout the State, particularly in the western and northwestern portions. In June Mr. Zappe and Mr. Plumb observed the larvae in Canaan, Salisbury and Sharon. Dr. Kaston observed them on maple and elm at Riverton, June 19. Caterpillars were received from Litchfield, June 25, and pupae from West Goshen, July 6. One property owner in Litchfield

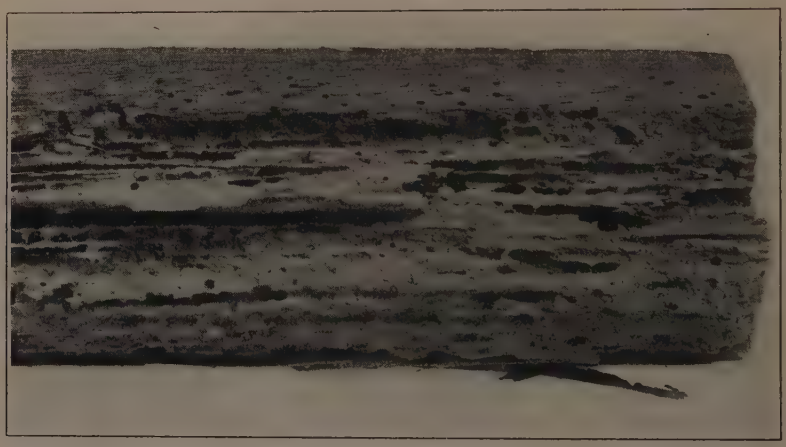

FIGURE 116. Section of joist injured by powder-post beetles from first floor of old house in Portland. Much reduced.

noticed the caterpillars feeding on his row of fine sugar maples along the highway and, fearing that the trees might be defoliated, had them sprayed with lead arsenate. A brief account of this insect with illustrations has just been published in Bulletin 378, The Eastern Tent Caterpillar. [W. E. Britton]

Elm Spanworm. The elm spanworm or snow-white linden moth, *Ennomos subsignarius* Hubn., was distinctly more prevalent than usual in 1935. The mature caterpillars are nearly two inches in length, brownish black, with irregular yellowish markings, and feed upon various shade and woodland trees. Both sexes of the moths are pure white, with angulated wing margins, and a wingspread of about one and one-half inches. Large numbers of the moths clustered around electric lights in Waterbury in July and J. C. Schread of this department reports that they were also common around lights in Bridgeport. In 1908, flights of the moths were

observed around lights for two days in New Haven. Then they disappeared. That same year and in 1909 heavy flights of moths were reported in New York City, in the Hudson River Valley and in other localities. Many years ago this insect severely injured the shade trees in New York, Brooklyn and Philadelphia, and from 1907 to 1910 large woodland areas in New York State were defoliated by the caterpillars. [W. E. Britton]

Prevalence of the Fall Canker Worm. In 1935 the fall canker worm, *Alsophila pometaria* Harr., was exceedingly prevalent in the southwestern corner of Connecticut. Particularly in Fairfield and New Haven counties where this pest was most abundant, many unsprayed fruit, shade and woodland trees were stripped. Also in the southern portions of Hartford and Litchfield counties, the fall canker worm was prevalent in some localities and had observations been made, probably the same would have been found true in Middlesex and New London counties. The fall canker worm is usually local or spotted in its occurrence in large numbers. A short distance from a heavy infestation, it may be present in such small numbers that it is hardly noticed. Moreover, the areas of intense infestation do not continue the same but change from year to year. The life history of this insect, with illustrations and methods of control, may be found in the report of this Station for 1934, page 213. A briefer account was also given in Bulletin 369, page 269, Insect Pests of Elms in Connecticut. [W. E. Britton]

Lime-Tree Looper. The lime-tree looper or lime-tree winter moth, *Erannis tiliaria* Harr., was more prevalent than usual in 1935, and was reported by several observers as occurring throughout the western portion of the State, often feeding on various kinds of shade and woodland trees together with the fall canker worm, the forest tent caterpillar and the elm spanworm. The eggs are laid singly or in loose clusters on the bark in October and November. The wingless female is about half an inch in length, greenish yellow varying to light gray or brown, and with two rows of black spots extending lengthwise of the back. The male is buff with each wing marked transversely with two wavy brown bands and sprinkled with small brownish dots, and has a wing expanse of about one and three-fourths inches. The mature caterpillar is about one and one-half inches long, bright yellow, with rust brown head and 10 crinkled black lines extending along the back. There is wide color variation. Some caterpillars appear almost black above, and others are distinctly light-colored. The appearance of the caterpillar and wingless female is shown in Figures 36 and 37 of Bulletin 369, Insect Pests of Elms in Connecticut, published within the year. [W. E. Britton]

Elm Leaf Aphid. The elm leaf aphid, *Myzocallis ulmifolii* Monell, is usually either not very prevalent in Connecticut or else has been overlooked. Nevertheless the scouting that has been carried on throughout the State, because of the Dutch elm disease, has brought to light several elm pests that have not heretofore been noticed. Samples of elm twigs from Simsbury, August 27, showed a few specimens of adults and nymphs, and although the leaves were dry when they reached the Entomology Department, tiny droplets of honeydew could be seen on the undersides and glistened in the sunlight. During the first week in September the

writer received a telephone call from one of the selectmen of Clinton, who stated that something was dripping in large quantities from the elm trees and that all automobiles parked under them in the village were covered. He was afraid that some important pest was present on the trees and spoke of spraying them. Later, entomologists from the Station examined some of these trees and found them heavily infested with the elm leaf aphid. Generally it is not advisable to spray trees so late in the season, but certainly they should be sprayed in June next year (1936), with lead arsenate and nicotine. [W. E. Britton]

Control of Apple Aphids with California Ladybeetles. In order to combat the rosy aphid, Mr. George L. Warncke of Cannondale imported 250,000 ladybeetles from California during May, 1935. The species obtained was the convergent ladybeetle, *Hippodamia convergens* Guer.-Men., and the specimens were released on the evening of May 22 and distributed systematically over the orchard of about 1,000 trees.

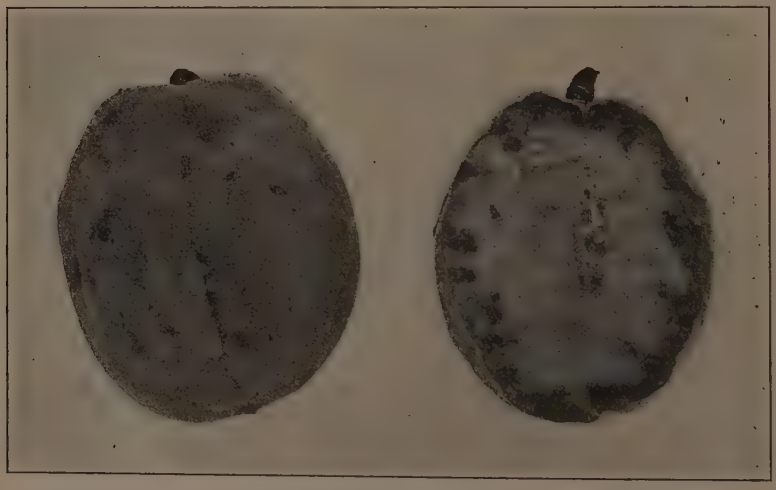

FIGURE 117. Peaches injured by plant bugs. Natural size.

Although 250,000 beetles were ordered by Mr. Warncke, it is estimated that not more than 220,000 live beetles were actually released because of mortality in shipping. An examination of the orchard on the day of release showed rosy aphids present in many places though not yet abundant. A follow-up examination of the orchard was made June 10 to learn what results had been obtained. Aphids were much more numerous on this date than on May 22, and few ladybeetles of any sort, either as egg, larva or adult, were present. Those that were found were brought to New Haven and reared, but proved not to be *Hippodamia convergens*. Apparently, the species did not find conditions suitable in this orchard and left the vicinity. Mr. Warncke reported that he had seen what appeared to be the same ladybeetle in his garden and other places, shortly after

their release in the orchard. It seems probable that they were attracted to other aphids more than to the rosy aphid, and in this case actual control of the rosy aphid was negligible. [Philip Garman]

Plant Bug Injury to Fruit. During July our attention was called to extensive damage to peaches by plant bugs. Judging from the amount of fruit punctured in different orchards it constituted a serious loss to many growers. Owing to the light crop in 1935, the results of the infestations were more prominent than they would have been with a normal crop. Inspection of orchards in Glastonbury and other points in Hartford County showed much injured fruit, but reports were also received from New Haven County. In some cases the injury was mistaken for that of

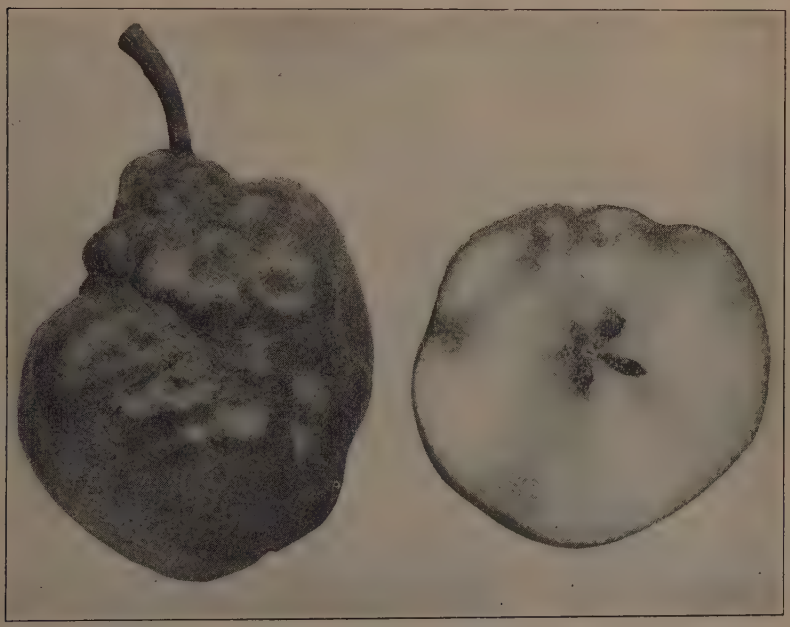

FIGURE 118. Pears injured by plant bugs. About three-fourths natural size.

curculio. The trouble results from the feeding of a number of species, all of which puncture the fruit and cause drops of gum to ooze out at many points. The condition of the fruit later in the season is shown in Figure 117. The species involved include *Lygus omnivagus* Knight, *Lygus quercalbae* Knight, and possibly *L. caryae* Knight and *L. pratensis* Linn. Injury in clean cultivated orchards indicated that most of the trouble may have come from species infesting nearby oaks and hickories, being more severe near such trees. Observations were not made in the orchards until after most of the bugs had disappeared, but a few were seen though not captured, and these strongly resembled *omnivagus*. Peaches with similar injury were received from Waterbury, August 6,

and pears from Killingworth, September 26 (Figure 118). Complaints of tarnished plant bug injury to pears was received from Branford. References: Conn. Agr. Exp. Station Bul. 305, pp. 729-731, Pl. 21, a and b.
[Philip Garman]

Abundance of Eastern Tent Caterpillar. The eastern tent caterpillar, *Malacosoma americana* Fabr., was extremely prevalent throughout the State in 1935, as it always is every 10 or 11 years. Apparently 1935 was a "peak year". Unsprayed apple trees and wild cherry trees were defoliated everywhere. Some caterpillars died from starvation and in certain sections the bacterial wilt disease killed others. On October 3 the writer, in company with other Station men, drove over the hills northeast of New Milford and examined several wild apple trees and chokecherry bushes by the roadside. Only a few egg-clusters were seen. On the other hand, in a small peach orchard adjoining the Station farm at Mount Carmel, the twigs were heavily infested with

FIGURE 119. Adult of *Plutella porrectella*. About four times enlarged.

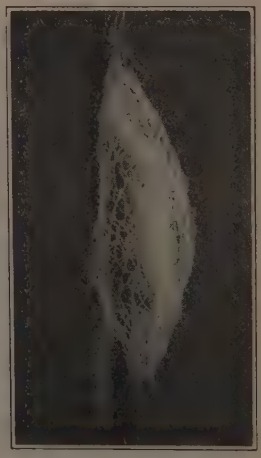

FIGURE 120. Cocoon of *Plutella porrectella*. Four times enlarged.

egg-clusters. There will be plenty of tent caterpillars in 1936, but probably somewhat fewer than in 1935, and it is expected that they will decrease for four or five years until only an occasional nest will be seen, after which they will again gradually increase. A full account of this insect with illustrations has recently been published as Bulletin 378 of this Station.
[W. E. Britton]

A Leaf Tier of Sweet Rocket. The writer has grown the white-flowered sweet rocket, *Hesperis matronalis* var. *nivea*, in his garden for several years and until 1935 no insect pests have been observed upon it. In 1935, during the first week in May, it was noticed that many of the new leaves had been webbed together and that small green larvae were feeding upon them. The infestation seemed to increase for about two weeks and nearly every plant was involved. Then the larvae ceased

feeding, pupated and caused no further trouble. The eaten and crumpled leaves were evident throughout the season, but all later leaves were uninjured and the plants blossomed as usual. On May 8, specimens were brought to the laboratory. The larva was green and about the same color as the leaves, with brown head and about half an inch in length. In a few days the larvae pupated in a net-like cocoon fastened longitudinally to a leaf or stem. On May 17 the adults began to emerge from the cocoons and proved to be *Plutella porrectella* Linn., a small silver-gray moth with wingspread of half an inch, and with dark margins at the tips of the forewings. This moth is closely related to the diamond-back moth, *Plutella maculipennis* Curt., which also feeds upon various species of plants of the Family Cruciferae, to which the sweet rocket belongs. Figures 119, 120 and 121 show the larva, cocoon, adult and injured plant, all natural size. [W. E. Britton]

FIGURE 121. Larva of *Plutella porrectella* and leaves of sweet rocket webbed together by it. Natural size.

Worms in the Cake. On September 26 a New Haven baking firm sent to the Station a cake that had been returned by a retail dealer because it was wormy. Of course it was blamed upon the baker. Two Lepidopterous larvae were feeding upon the cake, which had been wrapped in cellophane soon after it came out of the oven. The larvae were not recognized at the time, and an attempt was made to rear the adults. One of the larvae died and was placed in a vial of alcohol. The other larva fed on the cake until November 23, when it pupated and the adult

emerged December 2. Although smaller than the usual size, it proved to be a female of the European corn borer, *Pyrausta nubilalis* Hubn. Both adult and larva check very closely with the corresponding stages of that species. But how did it happen to be in the cake? No insect life can possibly survive the heat of the baking oven. Probably what happened is this: In the store, borers may have emerged from infested ears of sweet corn placed on the counter near the cakes. They were able to crawl under the cut margin of cellophane and work their way between the lapped edges until they reached the cake, and then began to feed upon it. Although pastry is not commonly mentioned as a food of the European corn borer, it is of some interest to learn that the borers can subsist upon it and develop to the adult stage, even though they do not reach their full stature as moths. [W. E. Britton]

Injury to Vegetables by the Garden Millipede. Occasionally the garden millipede, *Julus hortensis* Wood, is reported as causing injury to plants, usually hardy bulbs. Thus in 1907, plants in Guilford and North Haven were injured and at Guilford large beds of hardy bulbs were destroyed. In 1912 a large strawberry field in New Haven had many plants injured by this pest. Some of them had probably been injured during the winter and on May 13 the crowns had been hollowed out and were filled with these millipedes. In 1926, tulip beds in Hartford were damaged. Injury to pansy and lupine plants at Riverside was reported in 1930. Sweet peas under glass in West Hartford were injured in 1931. Specimens were received from Hartford in 1930 as present in a garden but no mention was made of injured plants. In 1935 this millipede was received from Cheshire, June 12, with a statement that many asparagus shoots had been injured. A bit of feeding on one side of the shoot causes it to bend over toward the side injured. Crooked shoots cannot be bunched with straight ones and if many are injured, the salable yield is greatly reduced, although the crooked shoots can be used at home. On June 24 specimens received from Westbrook were said to have injured tomato and pepper plants. Little is known about the control of this millipede, but it has been suggested that some of the individuals may be killed by dipping sliced raw potato, turnip, or other vegetables in lead arsenate or white arsenic and water and distributing the slices throughout the field or bed. [W. E. Britton]

The House Centipede. An occasional specimen of the house centipede, *Scutigera forceps* Raf., has been received by the Entomology Department of the Station, ever since the department was established in 1901. Usually the number of specimens has been small and not more than one a year at the most. In 1935, however, three specimens were received, as follows: Meriden, March 18; New London, July 9; Hamden, July 18. All were from dwelling houses. This centipede lives in damp closets and cellars but is often seen in the living rooms of houses and in greenhouses. It is a southern species but during the past 30 or 40 years has greatly increased as a household pest in the northern states. It feeds upon household insects such as house flies, roaches, small moths and other insects, and really does no harm to food materials or fabrics in the house. Its bite is said to be poisonous but there are few records of its having bitten human beings and it probably would do so only in

self defense. Nevertheless, housewives are considerably excited on finding these creatures in their apartments and do not welcome them. As one woman put it, "They scramble so". They often travel with great speed directly toward a person and sometimes stop suddenly and remain motionless. Little is known about the life history except that the very young specimens have fewer legs than the adults. The house centipede has a body slightly more than an inch in length, rather large head, two very long forward-projecting antennae, 15 pairs of legs, with the posterior pair much longer than the others, about twice the length of the body and projecting backward. The only control measure is a liberal application of fresh pyrethrum powder, directed upon the water pipes and into the closets, storerooms and corners where the centipedes hide.

[W. E. Britton]

Notes on the Fruit Tree Leaf Roller. A severe infestation of the fruit tree leaf roller, *Archips argyrospila* Walker, developed in two large apple orchards in one section of the town of Wallingford during 1934. The prospect of a good apple crop in 1935, together with abundance of leaf roller eggs, caused considerable anxiety to the owner of one of these orchards and he then applied special measures for its control. It was recommended that controls developed in other states be followed since these had been substantiated on a neighboring farm where the insect was being held in check. Six per cent oil emulsified with 1-2-100 Bordeaux mixture was used, and this was followed by heavy applications of lead arsenate applied together with lime-sulfur and a spreader. Egg-masses collected both before and after the oil applications indicated that from 88 to 100 per cent had been killed. Inspections of the orchard during the early summer showed almost complete elimination of the insect. The degree of control secured was influenced by the relatively dry month of May which allowed the poison to remain longer on the trees than otherwise would have been the case. The very thorough oil spray, however, was an important factor. During the winter, egg-masses were collected from the orchard and sprayed in the laboratory, part being kept at constant room temperature and humidity, and the remainder being placed out-of-doors. Results of these tests did not correspond fully with field experience, and the oil emulsified with Bordeaux mixture gave much lower kills both indoors and out than the same oils emulsified with skim milk powder, diglycol oleate, glyceryl oleate or some of the materials known as alcohol sulfates. Commercial spray oils of the sulfonate type used at 10 per cent did not kill more than 50 per cent of the eggs in outdoor tests, whereas those emulsified with skim milk using 6 per cent oil, killed from 95 to 100 per cent. Eggs under observation at the Experiment Station began to hatch May 6. At that time the pink spray had just been applied in the Station orchard at Mount Carmel (May 5).

[Philip Garman]

The Black Carpenter Ant. During the past year several cases of injury to wooden structures by the black carpenter ant, *Camponotus herculeanus* var. *pennsylvanicus* DeG., have been called to the attention of this office. About 20 infestations have been examined and in as many other instances specimens of the insect have been received for identification. There is no good evidence that would indicate that this in-

sect is increasing in either abundance or injuriousness in the State. The recent great interest in termites in this region has been partly responsible for more attention being paid to all kinds of insect injury to timber. Carpenter ant colonies usually occur in the outer timbers of buildings, such as those of the porches, eaves, cellar hatchways, and the like. They are also frequently found in chestnut telephone poles which have been standing for several years. This insect does not eat wood but excavates a dwelling place for the colony. The fine sawdust-like material resulting from the burrowing activities is thrown out and the burrow is always clean. Very frequently the spring wood of an annual ring is removed and the summer wood left, or one or two complete annual rings are removed for some distance. This results in the presence of thin lamellae of wood in the main part of the excavation, with long narrow burrows, crescentic in cross-section, extending in the direction of the grain. There is never any clay-like material so characteristic of termite work in the excavations of carpenter ants. In attempting to eradicate colonies of this insect, some success has been attained by fumigation and by the use of a poison bait. For fumigating colonies we have used a solution of one pound of paradichlorobenzene in two quarts of gasoline. A hole is bored in the infested timber at the top of the ant excavation and the solution poured in. The hole is then closed with a wooden plug. This is more applicable to upright (perpendicular) timbers than to horizontal, and the fire hazard must be considered. As a poison bait we have used a commercial sweet paste containing 1 per cent thallium sulfate. This material is very attractive to the ants and is sold in tubes which facilitates handling. A small amount of paste is placed where the ants can get at it, more being placed there later if it is all consumed. In several cases the use of this bait has resulted in the complete disappearance of the ants. Thallium sulfate is a violent poison and must be used with discretion. The bait may be protected from animals and children by placing it in a short piece of garden hose. [R. B. Friend]

FINANCIAL STATEMENT

Insect Pest Appropriation

(Section 2124 of General Statutes, Revision of 1930)

July 1, 1934 - June 30, 1935

RECEIPTS

Insect Pest Appropriation	$ 46,807.00	
Contribution from peach growers for peach moth parasite work	200.00	
Receipts from nurserymen (cost of inspection because of late registration)	45.00	
		$47,052.00

DISBURSEMENTS

Salaries	$ 27,889.00	
Labor	9,519.25	
Stationery and office supplies	314.07	
Scientific supplies (chemicals)	21.97	
Scientific supplies (other laboratory supplies)	96.68	
Scientific supplies (photographic supplies)	51.76	
Insecticides	104.52	
Lumber and small hardware	1.46	
Miscellaneous supplies	211.87	
Automobile oil	44.05	
Telegraph and telephone	644.75	
Postage	255.57	
Travel expense (outlying investigations)	3,224.94	
Travel expense (meetings, conferences, etc.)	277.94	
Travel expense (gasoline for autos)	537.82	
Transportation of things (freight, express and parcel post)	21.34	
Transportation of things (other expenses)	68.51	
Publications (reprints, etc.)	72.39	
Coal	257.83	
Gas and electricity	356.31	
Water	61.30	
Furniture and fixtures (new)	240.07	
Furniture and fixtures (repairs)	52.22	
Library (books and periodicals)	150.16	
Library (binding)	18.00	
Scientific equipment (new)	179.08	
Scientific equipment (repairs)	25.28	
Automobiles (repairs)	405.19	
Tools, machinery and appliances (new)	238.87	
Tools, machinery and appliances (repairs)	48.88	
Buildings (repairs and alterations)	286.55	
Rent of land	800.00	
Insurance (fire, burglary and automobiles)	217.48	
Miscellaneous contingent expenses	58.00	
Total disbursements		$46,753.11
Balance on hand June 30, 1935		298.89*
		$47,052.00

*Reverts to State Treasury

EXPENDITURES CLASSIFIED BY PROJECTS

(Approximate)

General	$ 25,504.49
Nursery Inspection	2,422.15
Japanese Beetle	6,218.61
European Corn Borer	6,479.03
Oriental Fruit Moth Parasites	5,545.01
European Pine Shoot Moth	583.82
Total	$ 46,753.11

PUBLICATIONS, 1935

W. E. Britton

Connecticut State Entomologist. Thirty-Fourth Report. Bul. 368, 116 and vi pp., 20 figs., with index. March, 1935. (Issued in June, 1935).

The Gypsy Moth. Bul. 375, 27 pp., 19 figs. August, 1935. (Issued in October, 1935).

Outbreak of Canker Worms. 8 pp., 5 figs. Reprinted from Bul. 368. (Issued in May, 1935).

Prevalence of Tent Caterpillars. Special Bulletin (mimeographed), 1 p. (Issued May 22, 1935).

Report of Committee on Injurious Insects. Proc. 44th Annual Meeting, Conn. Pomol. Soc., p. 76, 5 pp. April, 1935.

Report of Experiments with Vegetable Insects in 1934. Proc. 22nd Annual Meeting, Conn. Veg. Growers Assoc., p. 45, 5 pp. May, 1935.

Vegetable Insects in 1934. Proc. 22nd Annual Meeting, Conn. Veg. Growers Assoc., p. 86, 1.5 pp. May, 1935.

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Inspection of Nurseries, 1934. 11 pp. Reprinted from Bul. 368. (Issued in June, 1935).

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Control of Orchard Pests. Proc. 44th Annual Meeting, Conn. Pomol. Soc., p. 82, 6 pp. April, 1935.

Philip Garman and W. T. Brigham

Further Notes on Breeding *Macrocentrus ancylivorus* on the Larvae of the Oriental Fruit Moth. Jour. Econ. Ent., 28, p. 204. 2 pp. February, 1935.

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Effects of Mexican Bean Beetle Injury on Crop Yield. Jour. Econ. Ent., 28, p. 147, 1.5 pp. February, 1935.

The Development of Insecticides for Vegetable Crops. In program, 27th Annual Convention, Vegetable Growers Assoc. of America, Inc., 1 p. August, 1935.

Vegetable Pest Control. Conn. Veg. News, 1 p. October, 1935.

Neely Turner and R. B. Friend

Further Experiments on Mexican Bean Beetle Control. Bul. 371, 34 pp., 3 figs. June, 1935. (Issued in July, 1935).

NEELY TURNER and J. F. TOWNSEND

Prevention of Termite Damage in Buildings. Special Bulletin (mimeographed), 3 pp. May, 1935.

M. V. ANTHONY

Apparatus for Dusting Sulfur on Plants in Controlled Amounts. Science, 81, No. 2102, p. 364, 1.5 columns. April 12, 1935.

R. C. BOTSFORD

Mosquito Work in Connecticut in 1934. Proc. 22nd Annual Meeting New Jersey Mosquito Extermination Association, p. 122, 4 pp. June, 1935.

D. S. LACROIX

Tobacco Insects in 1934. Report of Tobacco Substation for 1934, Bul. 367. 8 pp., 2 figs. February, 1935. (Issued in April, 1935).

SUMMARY OF OFFICE AND INSPECTION WORK

Insects received for identification	670
Nurseries inspected	385
Regular nursery certificates granted (373 nurseries)	378
Duplicate nursery certificates for filing in other states	169
Miscellaneous certificates and special permits granted	137
Nursery dealers' permits issued	113
Shippers' permits issued to nurserymen in other states	223
Blister rust control area permits issued	126
Certification and inspection of occasional shipments	
Parcels of nursery stock	437
Narcissus bulbs for shipment (24 certificates)	2,000
Corn borer certificates	125
Packages of shelled corn and other seeds	2,895
Japanese beetle certificates (nursery and floral stock and farm products)	46,821
Japanese beetle certificates (soil, sand and manure)	598
Orchards and gardens examined	143
Buildings infested by termites examined	113
Shipments of imported nursery stock inspected	25
Number of cases	106
Number of plants	733,275
Apiaries inspected	1,333
Colonies inspected	8,855
Apiaries infested with American foulbrood	84
" " " European "	0
" " " sacbrood	3
Towns covered by gypsy moth scouts	84
Infestations found	369
Egg-clusters creosoted	345,935
Larvae and pupae killed by hand	721,799
Infestations sprayed	58
Lead arsenate used (pounds)	67,449
Miles of roadside scouted	2,049
Acres of woodland scouted	296,956
Letters written[1]	7,552
Circular letters issued	966
Bulletins and circulars mailed	4,411
Packages sent by mail and express	189
Post cards	115
Lectures, papers and addresses at meetings	72

[1] Includes 1026 written from the Japanese beetle office, 2,434 from the FERA office, and 116 from the gypsy moth office at Danielson.

ILLUSTRATIONS

The illustrations used as figures in this bulletin are from the following sources: Figures 110 and 111 from drawings by J. C. Schread; Figures 107 and 109 from drawings by Raimon L. Beard; Figures 93-97 from photographs by A. B. Street; Figure 103 from photograph by B. J. Kaston; all others from photographs by B. H. Walden.

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